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HOW THE EQUITABLE STOCK-JOBBERS FARED AT SYRACUSE, N. Y.

Defeated in their attempts to plunder the present gas purveyors of Newark, N. J., the stock-jobbing, patent-right peddling combination, known to fame as the Equitable Gas Light Company, of the United States, determined upon making a sortie into New York. They had previously found soft and easy picking within the bounds of the Empire State; and possibly reasoned that the picks, which had been blunted in prospecting over the surface levels of the Jersey gas mine above alluded to, might be considered still sharp enough to make a "strike" in the New York leads before they were returned to the repair shop to be edged anew. Utica and Syracuse were chosen as most likely spots to prospect for outcroppings, and subsequent results prove the judgment was well-founded, in so far as the first-named city was concerned. Our advices go to show that the city fathers of Utica allowed themselves to be dazzled by the spurious show of ore presented by the prospectors from Broad street, in this city; and while in that dazed condition granted the Equitable managers the right to operate an opposition works in the city which claims Roscoe Conkling—the professed exemplar of purity in modern politics—as a citizen. This right was secured on the plea of the wish of the applicants to furnish cheap gas to the people, despite the fact that Mr. Fish (Manager of the Utica Gas Company) proved to the Council that the Equitable advance agents had offered, in consideration of the payment to them, by the Utica company, of the sum of $30,000, to withdraw from the city without making any further attempt to secure from the Council permission to "sell gas cheaply" to the consumers of that article in Utica. Flushed with their Utica walkover, Messrs. Saportas and Fuller, who acted on this occasion as the carriers of the Equitable "grub-stake" for Central New York, at once set out for Syracuse. Here they were to encounter one who (as reigning President of the American Gas Light Association) may be looked up to as the "noblest Roman of them all," was likely to give them good battle The Syracuse Gas Light Company is possessed of a pretty good standing before the Syracusans, as prior marauders have long since experienced, and Brother Wood, knowing his ground, lost no time by delay. The combination men handed their "little bill" to the Council; and, to say the least of it, they actually outpromised themselves.. They would manufacture and distribute a 36-candle, extra fine article of Jerzmanowski gas, free from carbonic oxide, all for the sum of $1.30 per thousand cu. ft.—provided always that the Council would grant them permission to build a works. Mr. Wood brought his batteries to bear on the claims of the petitioners, and their operations in Brooklyn, Albany, etc., N. Y.; in Baltimore, Md.; Chicago, Ills.; etc., were explained in their true light. Feeling that their case was critical, the "combination" invited the committee to visit New York city to inspect the parent headquarters in the metropolis. The "inspection" included a visit to Delmonico's, but it is hardly to be expected that "Del's." was put forward as a section of the Equitable plant. Well, the committee returned (of course they were pleased with Delmonico's), handed in a report at the Council meeting of June 7th, and this was the result. The report was unanimous in pronouncing against the petitioners; and the Council, in Committee of the Whole, unanimously decided that the findings in the report were the wishes of the Council. Every Syracuse newspaper commended the action taken, and the *Herald* was tempted to say, "It depends upon the Syracuse Gas Company to determine when a competing corporation shall be given a foothold here. If it treats the public well it need not fear that its business will be injured by *needless* competition." Mr. Wood, in season and out of season, has been an earnest, practical advocate of the policy suggested by the *Herald*, and we opine that that authority need have no fear as to what the future will develop in his case. We would hint to Messrs. Saportas and Fuller they had better not trust "that set of picks to do any more prospecting."

The Annual Convention of the American Society of Civil Engineers will assemble this year at Denver, Colorado. Sessions commence on July 2d.

REFUSED TO SUSPEND THE RULES.—It is understood that the lower house of the Massachusetts State Legislature recently refused to suspend the rules to admit the petition of S. D. Winslow and others, who sought to amend the charter of the Beverly Gas Light Co., by authorizing the latter corporation to provide and furnish electric light in addition to supplying gas.

BRECKENRIDGE CANNEL.

Twenty-five years ago this cannel possessed a reputation never before attained by any other cannel, foreign or domestic. Its perfect purity, regular fracture, strength, and compactness made it a singularly attractive coal. In appearance it resembles "jet," and has sometimes been called "jet coal," from the fact that it has often been wrought into delicate ornamental articles which take a high polish.

This colliery, which has been unworked for several years, has recently passed into new management, and the preparations necessary to put it in thorough working order *have been completed*, and *orders for the cannel can now be executed promptly*.

To the older gas engineers of this country the Breckenridge cannel needs no introduction. The original charter of "The Breckenridge Cannel Coal Company" was granted by the State of Kentucky, Feb. 9, 1854, the main object of the company being the manufacture of illuminating oil from the cannel, for which purpose it had no competitor but the now exhausted Albertite of New Brunswick.

One ton of the Breckenridge cannel will yield about 140 gallons of crude oil, from which can be obtained 80 gallons of illuminating oil, 12 gallons of paraffine oil, besides other products, such as aniline, benzole, etc. *The above result is more than double that of any American, English, or Scotch cannel now obtainable.*

Upon the discovery of petroleum the manufacture of oil was abandoned, and the colliery has been practically idle down to the present time. No cannel has received more general attention than that which has been bestowed upon this deposit. *Its remarkable value as a gas enricher* has been discussed in all the geological works of the country. To gas engineers now using oil in any manner as a gas enricher the Breckenridge cannel offers a substitute possessing advantages which cannot fail to be appreciated, among which may be mentioned the following:

SAFETY.

While it contains all the valuable enriching qualities of naphtha, it is in such form that it needs no careful watching to prevent explosion.

EVAPORATION.

Every consumer of oil is aware of the great loss from leakage and evaporation which occurs while that article is in transit to the gas works, in many cases increasing the original cost of the oil over 30 per cent. We have specimens of Breckenridge in our possession which were mined 25 years since, and are as perfect now as fresh mined cannel, although exposed to the elements for so many years.

SUPPLY.

The excellent water and rail facilities which the company possess enable them to deliver the cannel as wanted, rendering it unnecessary for consumers to carry heavy stocks at any one time.

The State of Kentucky, in granting the charter to the Breckenridge Cannel Coal Company, in 1854, authorized and required the Governor of that State to appoint three commissioners to examine the property of the company with a view to its proper valuation. This commission consisted of Professor Benjamin Silliman, Jr., Geo. D. Prentice, Esq., and the Hon. Bryan R. Young; and their report to Governor L. W. Powell, dated February 21, 1854, contains a full and complete description of the property of the company. The following extracts will give a general idea of their conclusions:

EXTENT OF FIELD AND CHARACTERISTICS OF COAL.

"This bed of cannel constitutes the peculiar value of this property. Your commissioners satisfied themselves that it extends under a very large part of the entire territory of the company; we feel that it is safe to say that the cannel measure underlies *at least four thousand acres* of the land owned by the Breckenridge Cannel Coal Company. Its thickness may be set down as three feet for the whole territory, although it was somewhat more in several places. The character of the cannel is remarkably uniform at all points; and we examined it in about twenty different places in a circuit of eight or ten miles. The character of this cannel coal is entirely peculiar, and unlike any other cannel with which your commission is acquainted. Its peculiarities are—

"1st. The ease with which it ignites.

"2d. The power, volume, and endurance of its combustion, and its freedom from snapping explosions.

"3d. Its entire absence of loss from transportation and repeated handling.

"4th. Its resistance to atmospheric influences—frost, rain, etc.—by which all danger of slacking is avoided.

"Its easy combustion enables it to burn on the hearth of a common open fireplace, such as is used for wood. A single lump once ignited will continue to burn until it is all consumed. No shavings, or even paper, are required to ignite it—it will burn easily from the touch of a lighted match. Its combustion is attended with intense heat and most brilliant, voluminous flame.

"A chemical analysis, made under unfavorable circumstances, reveals the remarkable percentages of

63¼ per cent. of volatile matters;*
27 per cent. of carbon;
8½ per cent. of ash; and about
1 per cent. of water.

"Very few cannels have been observed which approach this richness in gas. A later analysis gave but *seven per cent. of ash;* and it is believed that this will be still further reduced in practical working. Of sulphur there was scarcely a perceptible trace.

"In comparing this cannel with the Hillsboro coal (Albertite), your commission discovered a resemblance in chemical composition, but a dissimilarity in general appearance, the Breckenridge showing a larger per cent. of volatile matter; *it is entirely free from slate.*

"In several places where we uncovered it for the first time, only a few inches under the surface, and even on the surface, we observed that there was not the least decay or disintegration in it, but the angles stood out sharp and clear. No better evidence could be desired of its capacity to resist atmospheric influences.

"Its remarkable elasticity is worthy of notice; it is also strongly electrical by friction, in which particular it is matched only by the equally remarkable coal from Hillsboro, New Brunswick, before mentioned."

In concluding their report the commissioners express the opinion that the property of the company contains *a minimum of twenty million tons of cannel*, the royalty on which should be twenty cents per ton—making a valuation of *four million dollars*. Or, quoting from their report to Governor Powell: "We do not, therefore, hesitate to return $4,000,000 as the estimated value, by our appraisement (under your commission), of the property of the Breckenridge Cannel Coal Company."

In 1876 a reconnoissance of this cannel field was made under the direction of the Kentucky Geological Survey, and a report of the same was submitted to Professor N. L. Shaler, State Director of that survey. This latter report confirms all that the earlier commission had developed, with the advantage that in the meantime the cannel had been worked to some extent for the manufacture of illuminating oil; and, had not the discovery of natural oils been made, there is little doubt that a prosperous business would have resulted.

Prior to this later examination, and during the manufacture of oil, several cargoes of the cannel had been shipped down the Mississippi river to New Orleans, and thence reshipped to New York, where its value as a gas enricher was at once recognized and appreciated. The marked interest manifested by the older gas engineers in the States in the re-opening of this colliery at the present time is the result of their experience with this cannel in former years.

The new company will possess unsurpassed facilities for the distribution of their cannel to required points in the *United States, Canada, West Indies, South America* and *Europe*. The mines border directly on the Ohio river. The shipping station is at Cloverport, Kentucky, as shown on the map. From this point the company can connect with the entire system of Pennsylvania Railroad Company, thereby reaching any required point north, east or west, while its location on the Ohio river (which at this point affords ample depth of water) brings the Southern markets, all within easy access.

The company's pier at this point on the river is a fine work, and capable of delivering over 1,000 tons of cannel daily, in connection with the nine miles of railroad just completed.

Cloverport is 110 miles westerly from Louisville, and 100 miles easterly from Evansville, from either of which points rail communication is reached. Cincinnati is 260 miles from the colliery. Chicago is about 300 miles, via. Rockport or Evansville. Cairo, the junction of the Ohio with the Mississippi, 190 miles. New Orleans is 1,182 miles from the colliery by the river.

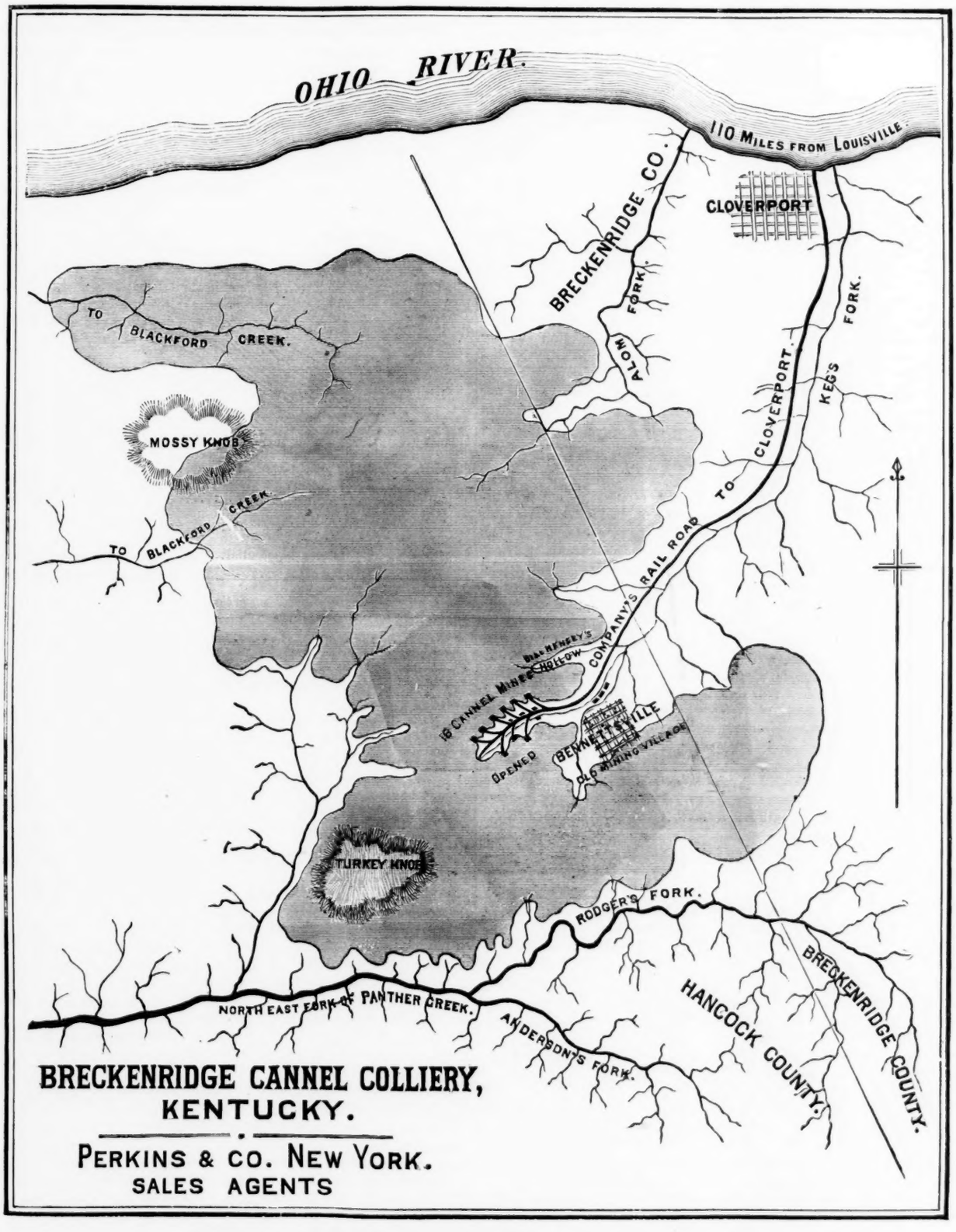
Tidewater on the Atlantic is reached by all rail to South Amboy, N. J., from which central point the New York and New England markets, as well as Southern Atlantic ports, can be supplied as needed at short notice.

Samples of the cannel can be seen at the office of the undersigned, who have been intrusted with the re-introduction of the article in the market.

Samples will be sent and particulars of price, etc., forwarded upon application to

PERKINS & Co.,
General Sales Agents,
P. O. Box 3695. 228 Produce Exchange, New York.—*Adv.*

* Recent experiments show over 70 per cent. of volatile matters.



MAP OF THE BRECKENRIDGE CANNEL COLLIERY, KENTUCKY.

This celebrated colliery is located directly on the Ohio river, at Cloverport, Kentucky. The cannel deposit embraces an area of over four thousand acres. A full description of this colliery will be found on the preceding page.

PERKINS & Co., Sales Agents,
P. O. Box 3695. 228 Produce Exchange, N. Y. City.—*Adv.*

[Official Report.]

Ninth Annual Meeting of the Western Gas Association.

Held at the Neil House, Columbus, Ohio, May 12 and 13, 1886.

First Day—Afternoon Session.

Mr. E. J. King, of Jacksonville, Ills., read the following paper, entitled—

MECHANICAL, MAGNETIC, AND ELECTRICAL UNITS.

It is but a few years since the absolute or c. g. s. units were introduced by Gauss and Weber to meet and satisfy the demand which had long existed for some fundamental system by which exact measurements could be effected, and the results be expressed in units which did not altogether depend on the circumstances of the experiments. So well were they devised that their adoption was rapid; and since their indorsement by the Paris Congress of Electricians, and later at Philadelphia, their employment has become almost universal.

Although I had, in a general way, understood more or less about them, my studies had not brought me to the point of having a very clear idea of the meaning of such terms as "dynes," "ergs," "amperes," etc.; and my desire to become more fully informed may be attributed to the fact that my attention was called to the subject by a paper read by Lieut. Barnes, of the U. S. N., which I had the pleasure of listening to last fall. I will not here attempt to go into the subject either as carefully or as scientifically as he then did; but I shall hope to give, to those of our members present who have not investigated the matter, some idea of the meaning and use of terms which I think must be as meaningless to them as they once were to me.

The basis of the c. g. s. (centimeter, gramme, second), or absolute units, is that it requires a unit power to move a unit mass (or weight) one unit distance in unit time. This principle has been long applied in what is known as the foot-pound, or the power that would move one pound one foot in one second. These units, however, did not admit of the delicate comparisons or measurements that are becoming necessary, owing more especially to the extended employment of electricity and magnetism. Hence the substitution of the centimeter and gramme for the foot and pound.

"The centimeter, the unit of length, is the one-hundredth part of a meter, which in turn is one ten-millionth part of the earth's quadrant at the equator.

"The gramme is the unit of weight and mass. It is the weight and mass of a cube of distilled water, the edges of which are one centimeter, the water being at its maximum density, or at a temperature of 4° C., and the atmospheric pressure 30 in."

The unit of time—the second—of course you are all familiar with.

Name of Unit.	Name of Quantity.	Dimensions.	Symbol.
Centimeter	Length	L	l
Gramme	Mass	M	m
Second	Time	T	t

The mechanical units are those used to measure force, work, power, velocity, and acceleration of velocity. As you are probably familiar with these terms, I will not attempt a full definition of them, but to refresh your memory will refer to them in the following brief way:

Force is that which changes or tends to change the motion of a body.

Work is the production of motion against resistance. There can be no work without motion.

Power is work done in a certain time.

Velocity is the distance through which a body moves in a unit of time.

Acceleration is the change of velocity per unit of time.

Energy is the power of doing work.

The unit of force is the *Dyne*. It is that force which, when acting upon one gramme mass, makes it move one centimeter in one second.

The unit of work is the *Erg*. It is the work done by the force of one dyne in moving through one centimeter, and equals a centimeter-dyne. The erg is also the unit of energy. The force of gravity acting upon the unit of mass increases its velocity in this latitude 981 centimeters per second; therefore the force of one gramme weight equals 981 dynes.

The thermal unit, called the *Calorie*, is the amount of heat required to raise the temperature of one gramme of distilled water from 0° to 1° C. In England the calorie divided by 4.2, or multiplied by 0.24, is called the *Joule*, and is used as the mechanical equivalent of heat. It is the heat necessary to raise 0.24 grammes of water 1° C. The joule is equal 10^7 c. g. s. units of work or ergs.

The *Watt* is the unit of power, and is $\frac{1}{746}$ of a horse power. It is equal to 10^7 ergs per second.

Table of Mechanical Units.

Name of Unit.	Name of Quantity and Value.	Dimensions.	Symbol.
.....	Velocity = length ÷ time	$L\,T^{-1}$	v
.....	Acceleration = velocity ÷ time.....	$L\,T^{-2}$	a
Dyne	Force = mass × acceleration	$M\,L\,T^{-2}$	f
Erg	Work = force × length	$M\,L^2\,T^{-2}$	w
Watt	Power = work ÷ time.....	$M\,L^2\,T^{-3}$	pr

There are two systems of electrical units derived from the c. g. s. units, one set being based upon the force exerted between two quantities of electricity, and the other upon the force exerted between two magnetic poles. The first set are called electro-static units, and the latter magnetic units. As I wish to deal more especially with practical electrical units, I will only give the tables of these units, which you may find useful for reference.

Electro-Static Units.

Unit of—	Value.	Dimensions.	Symbol.
Quantity.....	$\sqrt{\text{Force} \times (\text{distance})^2}$	$M^{\frac{1}{2}}\,L^{\frac{3}{2}}\,T^{-1}$	V
Current.....	Quantity ÷ time.....	$M^{\frac{1}{2}}\,L^{\frac{3}{2}}\,T^{-2}$	C
Potential.....	Work ÷ quantity.....	$M^{\frac{1}{2}}\,L^{\frac{1}{2}}\,T^{-1}$	P
Resistance....	Potential ÷ current.....	$L^{-1}\,T$	R
Capacity.....	Quantity ÷ potential.....	L	Cap

Magnetic Units.

Unit of—	Value.	Dimensions.	Symbol.
Strength of pole or quantity of magnetism....	$\sqrt{\text{Force} \times (\text{distance})^2}$...	$M^{\frac{1}{2}}\,L^{\frac{3}{2}}\,T^{-1}$	m
Magnetic potential.	Work × strength of pole.	$M^{\frac{1}{2}}\,L^{\frac{1}{2}}\,T^{-1}$	P
Intensity of field.....	Force ÷ strength of pole.	$M^{\frac{1}{2}}\,L^{-\frac{1}{2}}\,T^{-1}$	H

We will now consider the practical electrical units; and as some of you are adding practical electricity to your profession, I will try to make as plain as possible the meaning of terms which have had such an apparent mystery about them.

The *Volt* is a term used to express electro-motive force—usually expressed as E. M. F., or simply E. It is equal to 10^8 c. g. s. units, or about 7 per cent less than the E. M. F. of a standard Daniels cell. It is the E. M. F. that would cause a current of one ampere against a resistance of one ohm.

The unit of resistance is called the *Ohm*, and is equal to 10^9 c. g. s. units. The ohm is the resistance of a column of pure mercury 1 square millimeter in section and 1.06 centimeters long, at the temperature of melting ice. It is the resistance that would limit the flow of electricity against it under one volt to a current of one ampere, or the resistance against which a coulomb would flow under one volt in one second.

The *Ampere* is the unit of strength of current, and equals 10^{-1} c. g. s. units. It is the current produced by one volt against a resistance of one ohm.

The *Coulomb* is the unit of quantity, and is equal to 10^{-1} c. g. s. units. It is the quantity of electricity passing in one second, with an E. M. F. of one volt, against a resistance of one ohm, or the quantity of electricity that would pass in one second with a continued current of one ampere; also, the quantity that would charge a condenser of one farad under an E. M. F. of one volt.

The *Farad* is the unit of capacity, and equals 10^{-9} c. g. s. units. The farad is so large, however, that the micro-farad is generally used. The capacity of a condenser that would hold a coulomb, under an E. M. F. of one volt, would be one farad.

I have already spoken of the joule and the watt; but as they are so frequently spoken of in connection with the practical electrical units, I will give further definitions of them. The joule is the electrical energy absorbed when a coulomb falls one volt. The electrical energy absorbed in one second, when a current of one ampere passes against one ohm, or the amount of heat corresponding to the same.

The *Watt* is the power expended on a current of one ampere against a re

sistance of one ohm—the power developed by one ampere falling one volt. Now, by the use of Ohm's law, calculations become comparatively simple.

Ohm's Law.

$$\text{Current} = \frac{\text{Electro-motive Force}}{\text{Resistance.}} \qquad C = \frac{E}{R}$$

$$\text{Electro-motive Force} = \text{Current} \times \text{Resistance.} \qquad E = C \times R.$$

$$\text{Resistance} = \frac{\text{Electro-motive Force}}{C} \qquad R = \frac{E}{C}$$

Table of Electrical Units.

Name.	Unit of—	Value	Dimensions.	Symbol
Ampere .	Current or strength.	Intensity of field × length	$M^{\frac{1}{2}} L^{\frac{1}{2}} T^{-1}$	*C*
Coulomb	Quantity.....	Current × time.....	$M^{\frac{1}{2}} L^{\frac{1}{2}}$	*Q*
Volt	Electro-motive force	Work ÷ quantity.....	$M^{\frac{1}{2}} L^{\frac{3}{2}} T^{-1}$	*E*
Ohm....	Resistance.....	E. M. F. ÷ current.....	$L T^{-1}$	*R*
Farad...	Capacity	Quantity ÷ potential....	$L^{-1} T^{2}$	*Cap*

I believe there is no other agent with which electricity may be more fitly compared than gas. As we are all familiar with gas in its every department, let me use it to illustrate more fully the meaning of these electrical terms, and to more thoroughly impress them on your minds.

The electro-motive force, or E. M. F., then, is what we mean by pressure; and the term volt expresses to an electrician the measure of force, just as the tenth of an inch expresses the pressure of gas to us. The E. M. F. is sometimes called potential; and if a high or low potential, or a difference of potential, is spoken of, the meaning is exactly what we would seek to express by a high or low pressure, or a difference of pressure between two points.

The ampere and coulomb, you will notice, both have the same value in C. G. S. units. The ampere, however, is used to express the strength of the current of electricity at any moment of time; the coulomb, the quantity of the current in any unit of time. One ampere continued through one second gives one coulomb. Had we a word similar in purport to ampere to apply in gas nomenclature, it would be employed to indicate the conditions of pressure and friction in the mains; or, more precisely, the ratio of these quantities at any instant. The flow of gas depends entirely upon these conditions. If they continue uniform they measure the quantity of gas passing a given point in a given time; so when the ampere of current remains uniform one coulomb of quantity of current flows by any point of the circuit in one second of time.

A term corresponding to the coulomb would seem the more convenient and useful for application to currents of gas or water; but these are measured in cubic units, while electricity, having no real volume, is not capable of any such measurement; therefore it is found that in electricity the unit of strength of current (the ampere) is usually the more convenient. The coulomb is, I think, used more to express the idea of quantity as applied to electro-plating, to charge condensers or storage batteries, and to the efficiency of batteries. It would not be proper to say a current of so many coulombs, nor a capacity of so many amperes.

A farad means capacity, and is used principally in connection with condensers and storage batteries. Thus you will understand, when they talk of a condenser or storage battery of so many farads, that they mean what we do when we say a holder of so many cubic feet capacity. If, when a condenser is charged with one coulomb of electricity, its potential be raised from zero to one volt, it is said to have a capacity of one farad. Two coulombs would charge a condenser of twice the size to one volt; hence its capacity would be twice as great, or two farads.

The ohm is in electricity practically what we mean by friction—that which would in any way impede the flow of gas. The longer the gas main the more friction to be overcome; and the longer the electrical circuit the greater the resistance to the flow of electricity.

And now, gentlemen, I have tried, in as brief a way as possible, to make clear the meaning of the mechanical and electrical units, as also to make plain the meaning of electrical terms that are becoming more common to our literature every day. I trust that those of you who have not already looked the subject up may now have a more definite and clear understanding of these terms; and I can assure you that if in your spare moments you go deeper into the subject you will find it both interesting and profitable.

Lieut. Barnes has carefully worked out some tables of comparisons of the C. G. S. units, which he has kindly granted me consent to use, and I give them to you, feeling certain that you will find them very convenient for reference.

A Comparison of Mechanical and Electrical C. G. S. Units with those in Common Use.

Units of Work.

One volt-ampere
= 10^7 ergs.
= 0.737324 ft.-lbs.
= 737324×10^{-6} ft.-lbs.
= 0.24 calories.
= 1 joule.

One erg
= 10^7 volt-amperes.
= 737324×10^{-13} ft.-lbs.
= 24×10^{-9} calories.
= 10^{-7} joules.

One foot-pound
= 13.564471 ergs.
= 1.3564471 joules.
= 0.3255 calories.
= 1.3564471 volt-amperes.

One calorie
= 4.2 volt-amperes.
= 4.2 joules.
= 42×10^6 ergs.
= 3.0967608 ft.-lbs.

One joule = 10^7 ergs.
= 0.737324 ft.-lbs.
= 0.24 calories.
= 1 volt-ampere.

Units of Power.

One volt-coulomb
= 10^7 ergs per sec.
= 0.737324 ft.-lbs. per sec.
= 44.23944 ft.-lbs. per min.
= $\frac{1}{746}$ horse power.
= 134059×10^{-8} horse power.
= 0.24 calories per sec.
= 1 volt-ampere per sec.
= 1 joule per sec.
= 1 watt.

One horse power
= 33000 ft.-lbs. per min.
= 550 ft.-lbs. per second.
= 746×10^7 ergs.
= 7460 meg. ergs.
= 179 calories.
= 746 joules.
= 746 volt-coulombs.
= 746 watts.

One watt = 10^7 ergs per sec.
= 0.737324 ft.-lbs. per sec.
= 44.23944 ft.-lbs. per min.
= $\frac{1}{746}$ horse power.
= 134059×10^{-8} horse power.
= 0.24 calories per sec.
= 1 joule per sec.
= 1 volt-coulomb.

Value of Other Units.

One gramme = 15.432 grains.
= 981 dynes.
= 0.0022 lbs.

One lb. = 7000 grains.
= 453.6 grammes.
= 444981 dynes.

One dyne = 0.00102 grammes.
= 0.00157 grains.
= 224×10^{-8} lbs.

One grain = 0.0648 grammes.
= 63.5691 dynes.
= $\frac{1}{7000}$ lbs. avoirdupois.

One English thermal unit = 1 lb. water raised 1° F.
= 772 ft.-lbs.
= 1047.03 joules.

One volt = 10^8 C. G. S. units.

One ohm = 10^9 C. G. S. units.

One ampere = 10^{-1} C. G. S. units.

One coulomb = 10^{-1} C. G. S. units.

One farad = 10^{-9} C. G. S. units.

One meter = 39.37+ inches.

One centimeter = 0.39370432 in.

One foot = 30.48 centimeters.

One inch = 2.54 centimeters.

Discussion.

The President—In these days, or at a time when owners of many gas companies are considering the advisability of operating electric lighting plants in conjunction with their system of gas supply, this paper will prove of interest.

After a question put to Mr. King by Mr. Diall, in regard to high and low resistance, had been answered, the discussion took a decidedly practical turn. Mr. Lansden suggested that the momentous question for gas men to consider was whether the operation of a combined gas and electric plant would prove to be a good commercial venture. He thought that was the problem they should attempt to solve. In reply Mr. King said:

Mr. King—We erected an electric lighting plant in Jacksonville, and started it up on June 1st, 1885. We began on 8 lights, and gradually increased that number to 25; but for the last six months we have been furnishing three out of the 25 without making any charge for them. If we could supply 50 lights our running expense in the matter of labor would not be increased. For the twelvemonth our receipts have been $2,400, and our expenses figure out at $1,800, or a balance to profit of $600. The teaching of our year's experience is such as to cause us to believe that, in small towns at least, an electric lighting plant is a good thing to operate in connection with the gas system.

Mr. Thompson—What price do you get per light?

Mr. King—Forty cents per night, and extinguish at 11 P.M.

Mr. Scofield—Did you allow for interest on cost of your plant?

Mr. King—Not in the gross figures given.

Mr. Scofield—Allowing for the interest you did not make a profit of $600 on the year's working?

Mr. King—No, Sir.

Mr. Scofield—Wear and tear is allowed for?

Mr. King—Yes, sir.

Mr. Scofield—Was anything allowed in the shape of a rental allowance?

Mr. King—No, sir.

Mr. Scofield—What I desire to get at is the entire expense of running the plant.

Mr. King—If we could furnish 50 lights, under the circumstances noted, we would have paid interest, and, I think, a dividend, too. I am not arguing as to the money to be made out of such investments; but believe it is a good plan for the owners of small gas works to follow out. Our directors are more than satisfied with what we have done; and we are about closing a contract with the city by which we will light a district, formerly illuminated by gasoline lamps, with electric lights, and also retain our gas lamps in the portion of our city hitherto so illuminated.

Prof. Douglas—Do I understand that you include the expense for fuel in the figures given?

Mr. King—Fuel costs us very little. For the month of December it did not cost us a cent, because we used coke breeze which formerly we gave away. We used the breeze in connection with cinders screened out of the ashes from the furnaces.

Prof. Douglas—Then you make no charge whatever for fuel expense?

Mr. King—For a part of the year we did. During the first portion of the year we got our power from the boiler which actuated our exhauster. We subsequently put in a larger boiler; but the breeze and screenings are amply sufficient to keep up steam.

Prof. Douglas—Do I understand you to say that the fuel cost would be no greater when running 50 lights than when running 25.

Mr. King—No; I said the cost for *labor* would be no greater.

Prof. Douglas—I think you ought to take account of every expense. Would it not be a fairer comparison if you considered what the fuel would cost if you had had to purchase coal?

Mr. King—I am not arguing as to whether it is expensive or not. The question was simply asked as to our results, and I have given them.

Prof. Douglas—But you gave these results as founded upon the fact that the fuel cost nothing.

Mr. King—It cost nothing for half a year; and for the other half year its cost was very small.

Mr. Scofield—I am glad to hear these questions put and answered, because we are much interested in this matter. We are all desirous of knowing what the electric light actually costs. I submit that Mr. King's figures in relation to the operation of the Jacksonville electric station for the past year do not seem to possess much real value. He fails to make any allowance for the important item of interest or rental, and admits that his charge for fuel is very scant. What I would like to know is whether an outsider can go into Jacksonville, erect buildings, put up a plant, run it, and make money. In case we are compelled at some time or another to compete with the electric light, we would be in better position to fight it if we knew to what price we would have to put our gas in order to prevent them earning any money on their business.

Mr. King—Let me say these questions were not anticipated or expected by me as a corollary to the paper, and I am not prepared with the figures necessary to throw light on the queries.

Mr. Cornell—I would like to ask Mr. King about that coke breeze. It seems to me rather astonishing that he should have enough coke breeze to keep up the heats under the boilers of his electric station.

Mr. King—I had a large quantity on hand—accumulations from our plan of crushing coke. As I said, we also screened over the cinders, and even purchased breeze from neighboring cities. I made a test as to the value of fuel used, and I find that I have the figures of same in my note-book. The tests were, as far as possible, made under similar conditions. They were made on five consecutive nights, on five different sorts of fuel, and the respective weights of quantities consumed were carefully noted. The figures and qualities are as follows: Feb. 15th, we used 1,058 lbs. of slack; Feb. 16th, we used 1,043 lbs. of coke breeze; Feb. 17th, we used 1,001 lbs. of native nut coal; Feb. 18th, we used 881 lbs. of crushed coke; and Feb. 19th, the run was made on 886 lbs. of uncrushed coke. My grate bars were arranged for the consumption of slack and coke breeze, and, therefore, the results obtained when the coal and cokes were used can hardly be accepted as the best that might have been secured under another arrangement of the grate bars.

Mr. Cornell—The large quantity of coke breeze was secured because you use a coke crusher at Jacksonville?

Mr. King—Yes.

Prof. Douglas—It takes a certain amount of horse power to operate a dynamo in the production of a certain number of electric lights. Now, I will take the same weight of coal and make more light out of the gas produced from it than you would obtain as the result of its consumption under the boilers that actuate your dynamos. If that be so (and I confidently believe it), then I ask, "Where is the profit in the electric light unless you have the power given to you?"

Mr. Smith—What system does Mr. King operate?

Mr. King—The arc system.

Mr. Smith—If you had 50 lights, would you require much more power than that necessary to operate 25 lights?

Mr. King—Most assuredly. The general assumption is that each arc will absorb one horse power, roughly speaking.

Mr. Diall—If a regular electric light company had operated the station, and received for the light supplied a price equal to that paid the gas company, would Mr. King believe their showing would have been anything like the one he succeeded in obtaining?

Mr. King—With a 25-light plant, and getting the price paid us for the service, they would have lost money.

Mr. Jenkins—Can Mr. King give us, approximately, the items making up that $1,800?

Mr. King—As previously explained, I did not anticipate the discussion would take this direction, consequently, I am not fortified in the possession, at the present time, of the figures necessary to meet the queries offered.

Mr. McMillin—I think Mr. King must be rather surprised to note how well we all seem to understand the formulas contained in his paper, since we have not made any inquiries about them, although he kindly offered to explain them to those who did not readily comprehend them. I perhaps heard him read only one-half of his paper, and therefore am not obliged to task my memory to the extent imposed upon those who heard the whole of it read. However, I remember distinctly all the formulas given, and must say that Mr. King's method of placing them before us was most succinct and clear. I may also say I believe Mr. King's reference to the commercial value of his experiment is elaborate enough. He got 25 lights, and in their production used up a certain quantity of fuel per night. It matters not what that fuel cost him, and it counts for naught whether he had the fuel on hand or not, simply because each one here present knows what a similar quantity of fuel would cost him in his individual case. Of course, if Mr. King had figured in depreciation, interest, etc., it would still be more clear; but we can estimate those on a fair basis, and apply the total to our own close guidance—provided he will tell us roughly what sum the dynamos, wire, poles, etc., represent in the original cost of plant.

Mr. King—I am glad Mr. McMillin spoke as he did, for I am in constant receipt of letters asking about the expense. The expense will depend upon varying circumstances—the setting of the boilers, the kind and cost of fuel used, and other like items, which are not precisely the same in any two towns. I would not like to make a hard and fast statement on the matter, because my experience in the practical operation of the business has been limited. I would like to make it plain that difference in location will alter the cost of electric light production—in short, similar to the difference that exists in cost between gas manufactured in one city over that produced in another.

Mr. Scofield—I came here in the hope of hearing something definite on this subject. The electric light men now canvassing every little town in our Western country come to us with figures similar to those made here by Mr. King. They tell us that an electric light plant will yield us a profit of 2 or 3 per cent. per month on the business done; but when we dissect their figures we cannot fail to convict them of exaggeration. We, who are depending upon gas and its products for our business, want to learn—from those who, like Mr. King, are introducing the electric light for the sake of protecting their gas plants—the facts which will enable us to form a proper judgment as to what it is best for us to do. If we can obtain protection or safety by running an electric light plant, even at an increased expense, in connection with our gas plants, the question is whether it is for our interest to take that position and ground. I am deeply interested in this matter. I own the Fort Scott, Kansas, gas plant. Being the only stockholder therein it is natural I should feel a deep interest in determining the right course to take. Shall I put out my bench fires, shut up my gas plant, and give a free field to the electricians? You all know how insinuating these electric light advance agents are. They come into a town, go to the store owners and say, "Mr. Smith, we want authority to put up an electric light in your store. We will charge you for it $10 per month; and when that time has expired, if you are dissatisfied, we will take it out." Being a new thing, at first it sweeps clean, like a new broom, in a small town. That was how our town was drummed up; and in a very short while 30 arc lights were put up in our best business houses. It really looked as though we were to be overshadowed; but I must say that our gas output showed no decrease. In fact, if

anything, our business improved a trifle. The local electric light company offered to sell their plant to me, but I refused to purchase it.

Mr. King—When the electric light company first came to Jacksonville, very much to the surprise of its promoters we assisted them to introduce their light. We wanted them there; we appreciated the fact that our sales would not be diminished in consequence of their appearance; and in fact we thought they would be a help to us. The scheme failed, and it was dropped. The town remained without electric light for several months; but several of our customers wanted it, and felt aggrieved because they could not have it. On account of that expressed desire we purchased the machinery of the defunct company, and have since been operating it. We produce the light at a much less expense than its former manufacturers could, and our gas business has steadily increased. We told the people of Jacksonville that if they wanted incandescence lighting we would furnish them with it also. We said we were there to supply light, and the people could have any lighting agent they saw fit to call for. Our consumption has increased; and we believe the introduction of the electric light has aided the increase in gas send-out. Friend Scofield promises to visit me at Jacksonville. Well, I hope he will. In fact, let me say to him and to the other members that if the Association sees fit to appoint a committee, instead of visiting Jacksonville individually, to investigate this matter, I will give you all the information I can. We have one of the latest engines, a very popular electric light generator, a new setting of boilers, and are working under the most favorable conditions. Further, we have everything necessary to conveniently form the basis of a series of experiments and tests. If you will go there I will have the necessary apparatus in readiness, and will be personally at your service. You may take just as many days as you choose in which to make the experiment, can try any sort of fuel you want, and can make the test under any conditions you may select. The works are at your service.

The President—The Association appreciates your invitation.

Mr. Scofield—No one could ask anything fairer.

Mr. Lansden—Mr. King, suppose a town boasting of between three and and five hundred meters was threatened by an electric lighting scheme; what would you advise the proprietors of the gas company to do under the circumstances? Would you advise them to put in an independent electric lighting plant, or would you wait until the adversaries had introduced their system, in the expectation that when the newcomers tired of their venture the gas folks might step in and get a bargain?

Mr. King—That would depend a great deal on the system which it was proposed to introduce. As far as we were concerned, we did get the plant at a reduced price. It was a good one, and was well worth the money paid for it.

Prof. Douglas—Were your predecessors "sick unto death," or so sick that you were able to buy them out below cost?

Mr. King—They were very sick indeed. I do not assert that this conjoint operation is a good one to pursue in large cities, and for many reasons. Gas purveyors in large cities ought not to care very much about electricity as a lighting agent; but in small towns I think the reverse is the case. The loss of 25 to 30 consumers is a big item to a small gas company, for by the time the 25 or 30 are ready to come back to gas the gas company may have suffered serious loss.

Mr. Bowers—How long will a dynamo and plant last?

Mr. King—I have only had one years' experience with ours; but beyond the wearing away of journals and depreciation of armature, I should imagine the loss to be trifling. The conduit system, however, needs frequent attention.

Mr. Bowers—We, at Hillsboro, Ohio, have a most wise (?) Council Board, and in their wisdom they have said—for have they not found out all about it—we (the gas company) can make and distribute gas at a cost not to exceed 36 cents per thousand. We offered to sell them our works (which cost us over $30,000) for $20,000; but they would not buy them. They wanted the electric light. Someone proposed to sell an electric plant to the town outright, and let the authorities operate it; but the proposition was not favorably received. If I thought we could profitably run an electric plant in connection with our gas system, perhaps we might try the plan. This discussion has interested me greatly.

Mr. Smith—My advice to this Association is to let the electric light take care of itself. In our little town of Grand Rapids, Mich., we have both arc and incandescent lights operated by an independent electric company. At first we were inclined to think harm would come to us; but the fact is we are now making 28,000 to 30,000 cubic feet of gas more per day than we did before the electric light was introduced. We let them take their own way, feeling satisfied that we were all right. If the people want electric light let them get it from somebody else, and when they get tired of it they will come back to gas fast enough. I think, if we would have no trouble from the electric light purveyors, we should let them supply it.

The President—I would like to ask Mr. King if he computes his arc lights at 2,000-candle power?

Mr. King—I have never made a test for candle power.

On motion of Mr. McMillin, the thanks of the Association were tendered to Mr. King for his paper.

Mr. Jno. Gimper, of Leavenworth, Kansas, now read the following paper, entitled—

CAN A CONSTANT AND UNIFORM DRAUGHT BE MAINTAINED IN REGENERATIVE FURNACES?

The universal fuel used for the production of heating gases in gas works is coke, which, it is needless to add, varies greatly, and in consequence of the different qualities of the coals from which it was produced. The variations may be included under the following:

First—As to the quantities of ash and clinker.

Second—In regard to the nature, fusibility and cohesion of the clinker.

Third—In the matter of its density or hardness.

Hence, accordingly as the coke lies close or loose in the furnace, producing more or less clinker; and as such clinkers are fusible at a high or low temperature, and to what degree they will bake and conglomerate together; and according to the depth of coke maintained in the furnace—in that proportion will it be necessary to maintain a certain draught to produce a certain volume of heating gas, and a normal condition of furnace and bench. The maintenance and regulation of this draught is accomplished, in part, by a damper, usually in the main bench flue; and in part by the slides or openings for the admission of the primary and secondary air supply, together with the admission of steam.

Accepting this as correct, and observing the proper use of slides and dampers, it might seem that there would be no difficulty in constantly maintaining a normal and uniform draught, with the result of securing uniform heats. This I find not to be always the case; heats will change. To-day we find the heats are high—ashes and clinkers are porous, indicating a normal draught. To-morrow we may find a change. The heats are down, or looking down; or they may be going up and are getting too high. Clinkers will be large and hard; or there may be none at all—indicative of an abnormal draught. And these varying conditions are seemingly unexplainable, because nothing has been done to actuate this change—the slides, dampers, steam, coke, and charges are just as they were, to every intent, only 24 hours previous.

It is true, barometric changes will influence the draught, and so change the heats; but I have observed these fluctuations in heats even when there was no apparent variation in the barometer.

In our works the cleaning of the furnaces is done once in 24 hours. The accumulation of ashes and clinkers during that time must necessarily cause a variation in draught. It cannot be the same during the twenty-third hour that it was during the second or third. If the heat becomes too high in the furnace, the clinkers will fuse and conglomerate with the ashes into a compact mass, and thus retard the draught. And when the furnace is filled too full with coke, or, on the other hand, when the fuel depth is allowed to become too low, the draught will again be influenced. Too much or not enough steam will also affect draught and heats. In fact, I have found that the adjustment of the proper amount of steam is a very delicate operation. When a downward change in heat occurs I ask my stoker to call me when the fire in the particular bench is being cleaned, for the purpose of observing the condition of the ashes and clinkers. They are the best criterion of how the draught and steam conditions have been maintained in the 24 hours. Any change in slides or damper will be based upon the observation made—not ignoring the quantity of coke consumed. Again, at other times, I would go down into the cellar for the purpose of observing the ashes and clinkers, being moved to the visit on account of a downward appearance in heat, and would then often find the ashes and clinkers as near right as it was possible to get them; and when that was the case I would allow the slides to stand untouched for 24, perhaps for 48 hours, at the end of which time the heats would invariably be righted.

To obtain the best results with our coke, I want draught enough for the primary air supply to cause the formation of clinker sufficient to make a crust strong enough to support the fire, and with only enough steam supply to keep the clinkers or crust porous. This arch of clinker seems to follow the fire upward, and when so formed permits of the easy removal of the ash from under it. The crust is then easily broken, by commencing at its back end, which operation will allow the fire to fall on the grate bars.

I would, therefore, ask my brethren who use regenerative furnaces if they have observed like conditions, and if so, what are the causes thereof? I would not have those who do not use regenerative furnaces understand me to say that the heat fluctuations mentioned are so great as to form a serious objection to the principle of heating benches on the regenerative system. By no means; for they do not occur as often or to that degree, as with the ordinary benches. My purpose was to call your attention to these minor imperfections, to the end that the discussion would, if possible, teach us how to overcome them.

Discussion.

The President—Having observed the same phenomena, I would like very much to have something tenable offered in explanation of these fluctuations in heat.

Mr. McMillin—In connection with the subject I wish to mention a fact which furnished me with a surprise. The other day one of our benches was not working to suit me, and in altering the steam feed an excess of same was allowed to enter. Next day I found the fire in poor condition, and the stoker in charge said that running in so much steam filled the furnace with ashes. I told him he must be mistaken. His reply was, "Ordinarily the ashes are removed once in 24 hours; but they have been shoveled out twice to-day, and the furnace is now ready to be cleaned again." The coke we were using at the time was produced from broken coal; and it would burn up quickly. With ordinary draughts the furnace clinkers over, as Mr. Gimper has said. If you do not regulate the quantity of air admitted it will regulate itself, in a measure; but running in an excess of steam breaks up the "arching" spoken of. If your coke will burn freely and not be quenched, it has to decompose the steam excess, and will be consumed perhaps three times as rapidly as would be the case if it were an excess of air that was fed in. My benches, however, were pretty well heated, and I had no fault to find with the retorts; but the furnace itself was filled with ashes, and was much colder than I cared to have it.

Mr. Lansden—In regard to Mr. Gimper's comparison of regenerative furnaces with ordinary furnaces; is it not true that we cannot depend upon a regular draught on any fire in consequence of the constant change or alteration in the shape or position of the interstices in the fuel mass? Is it not impossible, unless the coke lies in exactly the same plane all the time, to keep up a uniform draught?

Mr. Gimper—I think Mr. Lansden is correct. It is not possible to have the same condition of draught at one hour as at another. However, the different qualities of coke used have much to do with the variations. An ashy coke, comparatively free from clinker, will give less trouble than one running more to clinker; and for the reason that the residue of the former, being more porous than that of the latter, offers less resistance to the flow of air through the mass. A too free admission of steam is liable to permit of the retention of particles of moisture in the ash, and that deposit will act as an obstruction to the air flow. In fact, I believe you might readily put out your fires in that way. The regulation of proper amount of steam fed to the bench is a very important thing; moreover, it is a very difficult matter to keep proper control over. A bare movement of the steam valve may admit an excess or deficiency. With our regenerative furnaces we have much more satisfactory results than were obtained under the old way of firing.

Mr. Smith—Do you use regenerative furnaces exclusively?

Mr. Gimper—Yes, sir.

Mr. Smith—Would you advise the use of steam in common furnaces?

Mr. Gimper—My answer would depend altogether upon the construction of such furnaces.

Mr. Printz—Do I understand Mr. Gimper to say he clinkered the furnaces once in 24 hours; or was it that he only removed the loose ashes in the operation?

Mr. Gimper—We remove the ashes and such clinkers as come with them, but do not draw the fires. The fires have not been completely drawn for a year. We do not draw the bars until a solid mass of clinker has formed, at which period room is made for the clinker to drop into. When we clean and change from one boiler to the other we almost universally notice a change in the heats. One boiler seems to send off drier steam than the other. I state this simply to show how sensitive those fires are to changes in steam feed. We have not drawn our bars and clinkered out, as is done in the common furnace, for the past year.

Mr. Printz—What pressure of steam do you carry; and how far do you carry it from the boiler to the furnace?

Mr. Gimper—We generally carry 40 pounds on our boilers. The distance traversed is a little over 25 feet, the conveying pipe being ¾-inch.

The President—I would like to ask Mr. Gimper what draught he has.

Mr. Gimper—Only the natural draught. Our chimneys extend outside of the roof of the building.

Mr. Diall—What regenerative furnace do you employ?

Mr. Gimper—It has not yet been christened. It is an adaptation of my own.

Mr. Printz—What is the depth of fuel? Do you have separate chimneys, or do they unite?

Mr. Gimper a separate chimney to each bench. We find that 2½ to 3 feet of fuel depth is the right figure on our coke.

Mr. Dunbar—How often do you charge the furnace?

Mr. Gimper—We draw the contents of the two lower retorts right into the fuel bed, when drawing off to recharge.

Mr. Dunbar—Do you draw both bottom retorts at one time?

Mr. Gimper—No; one at a time.

Mr. Smith—How many retorts to a bench?

Mr. Gimper—Six.

Mr. Smith—How much gas do you make?

Mr. Gimper—Day before yesterday (May 10) we made 57,000 cu. ft. from one bench of sixes.

Mr. Smith—What dimension are the retorts?

Mr. Gimper—15″ × 28″; but remember this result was secured with Kansas coal—a very different material from Youghiogheny.

Mr. Howard—What yield to the pound do you get from it?

Mr. Gimper—From 4.50 to 4.60; when taking 5 feet from it I get pitch.

Mr. Lansden—Do you run four-hour charges?

Mr. Gimper—Yes, sir.

Mr. Printz—You speak of 2½ to 3 feet of fuel depth. Is the coke hard or soft?

Mr. Gimper—It is neither as dense nor as hard as the Pittsburgh coke.

Mr. Howard—What weight of coal, on an average, do you put in the upper retorts?

Mr. Gimper—I may say the heats in top retorts are much better than those on the lower ones. I have charged 400 pounds in the top retorts, and carbonized that weight in four hours; but the ordinary weight is 350 pounds. I charge a lower weight in the bottom retorts because, as said before, the heats are less intense at lower point.

Mr. Lansden—Where do you buy your coal? From what mine does it come?

Mr. Gimper—It is Weir City coal, mined near the Missouri line.

Mr. Ramsdell—You say you use the coke from your lower retorts. Would that be one-third of your coke product?

Mr. Gimper—No; for I have said we charge a less weight of coal in the bottom than in the top retorts.

Mr. Ramsdell—At what per cent. do you figure it?

Mr. Gimper—Generally speaking, 24 per cent.

On motion of Mr. McMillin, a vote of thanks was tendered to Mr. Gimper for his paper.

(To be Continued.)

[Official Report.—Continued from page 321.]

Second Annual Meeting of the Ohio Gas Light Association.

Held at the Arcade Hotel, Springfield, Ohio, Mar. 17 and 18, 1886.

Second Day—Morning Session—Tuesday, Mar. 18.

The President announced that Mr. T. A. Bates, of Circleville, would read his paper, written in answer to the question—

WHAT MUST GAS COMPANIES DO WITH THE ELECTRIC LIGHT?

The wording of the subject assigned me I take to mean, "What attitude must the gas companies assume toward the electric light companies to counteract the effects of the opposition of the latter?" I also assume that a statement of results of operations in actual experience is wanted, relegating to each member the duty of deciding for himself (as he assuredly will) what is best to do in his individual case. Certain conditions and circumstances in connection with our business precludes the adoption of any fixed method of procedure, either in details or taken as a whole. Thus it becomes the duty of each company's representative, in listening to the varied—and often conflicting—statements at our meetings, to take these into consideration, to carefully sift them all, and treasure up for future use that which he thinks is most applicable to his needs.

All are doubtless aware that when the electric light first promised to become a factor in the problem of public and private lighting, every member of the gas fraternity whose opinion we either read or heard of predicted for it a speedy failure, and permanent retirement from the field. You need hardly be told that it has not retired—as yet. Soon the subdivision of the electric current was spoken of, and laughed to scorn. It was nevertheless accomplished; and preparations were made for the manufacture, on an extensive scale, of the pear-shaped bulb, with the hair-like loop inclosed, and with which some of us have become so painfully familiar. But of this, as of other subjects—naphthaline, to wit—it has been my endeavor to avoid that feeling of contempt which too great familiarity usually breeds. At that time, and when the Western Gas Association was in its infancy, an honored member thereof, widely known for his acquirements, asked the privilege of a secret session. There he told us, as a result of personal and thorough investigation, that he was fully convinced the incandescent system of electric lighting had come to stay; that the effect of the new system on the use of gas would be disastrous; and that it were better for us to trim our sails to meet the breeze. He also, at the same time, made some very practical suggestions as to how this could be done. To say that, after the meeting, he was (privately) most heartily cursed and condemned is putting it mildly. He would have been called a "Mugwump" had that name then been coined.

While it is true his predictions have as yet been by no means fulfilled, still, in some cases, and with some of us here, the prognostication has bordered for a time upon the line of verification.

I mention this incident (by no means the only one) as showing our intolerance of opinion. If at our meetings we ask for an opinion, and it be honestly given, let us not, because contrary to our own, laugh at the giver.

Without attempting a compilation of statistics, or bringing forward a mass of figures as proof, I think it would be useless to attempt to deny that the application of electric light is on the increase. In other words, it is to-day used in more cities or towns than was the case six months ago. And it is equally futile to assert that the incandescent system, by reason of its greater adaptability to private lighting, is the more dangerous to us as a competitor than is the case with the arc. When the subject of the electric light as opposed to gas is discussed, we are usually consoled by the statement that, "While we may have lost some consumers, the demand for increased lighting, caused by the use of the electric light, has more than offset our loss, and that we sold more gas this year, with competition from the electric light, than we did last year without it." This may all be true; but have you kept up the ratio of increase of former years? Further, have you not been forced to make concessions to your consumers other than you would have done but for this opposition?

I doubt very much if the electric light has proved a blessing to any gas company in whose territory it has located. Neither do I think all gas companies encountering this opposition suffer alike. In the city of "A." the gas company—while not exactly idolized, as in the city of Richmond, Ind.—may be in very good standing with the people. The electric light company, by injudiciously placing its stock with obnoxious individuals, and by giving an unsatisfactory service to its patrons, may first fail of securing a large consumption, and then weary the patience of those it has secured through the imperfection of the lighting service rendered. In "B." the conditions are reversed. The most energetic citizens, or those possessed of varied and extensive influence, are secured as stockholders. Every energy is bent, and every influence is brought to bear to the work of securing patrons. To these the company gives a really excellent light—remarkably free from interruption of any kind. Under these circumstances it is not to be supposed the gas management of both places will have like opinion of the opposition.

Many gas men have a panacea for all the woes of opposition—this is especially so of those who have not yet tasted its sweets; it is *good gas and low prices*. These are, indeed, excellent cards, but do not always "rake in the pot." We have other comforters who are continually telling us (and proving it, too) that electric light—particularly the incandescent—cannot be made as cheaply as gas. With these I have no argument, being of their own opinion; but what consolation is this knowledge to a gas company that, by reason of this opposition, has seen its income growing beautifully less, and its surplus as utterly "gone" as the honesty of the "Ohio Boodlers." I will venture the assertion that there is more than one company in the State that would be in the same position after two years of well-managed opposition.

Possibly the experience of the company I represent may prove of interest to you. The facts here given have been gathered with care, and the figures will tell, briefly but eloquently, what we have had in the shape of a "blessing in disguise." May 13th, '84, the engine of the Circleville Electric Light Company first turned wheel. The system is the "Edison Incandescent;" capacity of plant, 1,000 lamps. They have now some 1,600 lights wired, about evenly divided between 10 and 16-candle lamps—the plant being worked pretty well up to its full capacity. Up to the 1st instant their charges have not been based on any regular schedule, but claimed to regulate their rates in agreement with those charged by the gas company, and statements made by their consumers are so conflicting that it is impossible to give the prices really charged. Beginning with the first day of March, meters were to be placed, and the charges were to be reckoned as follows:

Electric light equivalent to	5,000	cu. ft. of gas, or less....	$2.00	per M.
" " "	5,000	" and under	10,000..	1.90	"
" " "	10,000	" "	20,000..	1.80	"
" " "	20,000	" and over.....		1.75	"

The gas company has also raised its prices to correspond—charging, however, but $1.00 per 1,000 cu. ft. for gas used in cooking, heating, or motive power.

The light furnished has been very good, and the accidents—so frequent elsewhere—comparatively few. A comparison of the two lights for general effect leads me to the conclusion that the electric light has been more pleasing to the public by reason of the clear whiteness of its rays, and the almost entire absence of heat; but we also find that Hocking coal, with a mixture of 12 per cent. of West Virginia cannel, gives a 19-candle gas that rivals it in whiteness. When burned in a Siemens-Lungren 12-feet burner the gas entirely eclipses the electric light. As to the relative light-giving qualities, the Rumford shadow test proves the light from a ten-candle electric lamp to be equal to that given from a 5-feet Sugg or Bray fishtail burner. In all candor I must say our people seem to be well pleased with the quality of both lights.

The question of the cost of producing the incandescent electric light has been handled by abler persons. Neither can I go into that question with the minuteness I desire. I will, however, give a few figures which I think cannot be successfully disproved. From these your own conclusions can be drawn as to the money made by our electric lighting company. The plant in Circleville represents $10,000 in first mortgage bonds; $15,000 in second mortgage bonds; and $30,000 of stock—in all, $55,000.

The coal used in the engine room of their works, in 1885, was one-half of one per cent. more than all of the coal used at our gas works in the same year, and cost them more per ton. Their receipts, in December last, were less than one-half those of the gas company. This would, however, be an unfair comparison for them the year through. They had existing contracts at so much per light per month for the year, while the gas company's receipts are based on actual consumption, and vary, between summer and winter months, 40 per cent. or over. Under the most favorable circumstances, however, we can safely say their receipts were far less in '85 than were those of the gas company, and the latter supplied gas at an average price for the year of $1.12½ per 1,000 cu. ft. If, under this condition, the gas company, with but $26,000 of stock, failed to earn expenses, the dividends of the electric light company, with $55,000 stock and bonds, can be readily computed.

Now, as to the results of this fight with respect to the gas company. In 1881 it was decided to make such reduction in price of gas, from time to time, as the increased business of the company would justify. In that year the price was lowered, from $3.33 per 1,000 cu. ft. to $3. Again, in '83, a reduction was made to $2.60. In '84, before the electric lighting plant went into operation, a cut was made to $2 per 1,000 cu. ft.; and from beginning of the opposition operations to end of '84 price of gas was at $1.50; from Jan., '85, to end of Sept., '85, gas was was sold at $1; in October, November and December, '85, for $1.50; or an average for the year of $1.12½ per thousand.

Theoretically, consumption of gas increases in an increasing ratio with the decrease in price. How did this hold good in our case?

	Per cent.		Per cent.
Decrease in price of gas, '81...10	Increase in private consumption..		6.9
" " " '83...13	" " " ..		10.1
" " " '84...32.66	" " " ..		28.5
" " " '85...35.75	" " " ..		9.5

Or, as a summary of the five years, we have: Total decrease in price of gas, 66.3 per cent.; increased private consumption, 56.25 per cent.

The company's income in '85, with increased sales equal to 56.25 per cent., was but 61.75 per cent. of income in 1881. There being no material change in price of coal and labor in this period, it is not astonishing that the company found itself sometime ago without a dollar of surplus.

I have as fully and briefly as possible given all the facts bearing on this question which were obtainable, or that could be verified. We must now devote a few words to the methods to be adopted to meet the opposition of electric light. To any company threatened I would say—carefully canvass your town, and if you find your consumers have the electric light fever badly, put in your own plant and give them the light. You can operate it at less cost than anyone else; and your surplus (if you have any) is better in this shape than if spent in fighting an opposition company. If you already have the opposition, or decline to act on this proposition, then make a careful examination of the workings of your company. See that the best economic results are obtained; fix the lowest possible dividend your stockholders will accept; put the price of gas at the very lowest rate consistent with making the same; have, then, a committee of influential citizens, or of council, examine your books, and certify to the fact that such figure is the lowest possible one consistent with making a legitimate return on your investment. Publish this report freely in the community; furnish good gas, and leave the rest to time. The American people are credited with the possession of a keen sense of justice, and this will apply to financial as well as to personal privileges. Assure the public you *are* giving them the lowest rates, and the better element will support you. You will be as sure to see the sale, consolidation, or utter collapse of that opposition as you see day follow night. I must also enter my humble but earnest protest against the suicidal policy of a gas company (at least of the size of the majority of those represented here) putting rates of gas below a living price, and that price based on your present consumption. I say your increased consumption will not (there may be a rare exception) make good a cut of 40 to 60 per cent. in your former prices, unless those were extortionate—in which latter case you deserve to be buried under opposition and the curses of the community. I favor low prices for gas, but advise caution in scaling down.

A word or two more and I am done. Our company is now selling a little more gas than ever before at this season of the year. We have more meters set than at this time in '85, and for the last four months the status of the two companies, as to number of consumers, has remained practically unchanged. It remains for the future to tell what will be the result of our efforts to get back to living prices again.

If the facts here presented prove of interest to any of you, or call forth dis-

cussion that will develop other ideas on the subject, then am I amply repaid for my trouble.

Discussion.

Mr. Bowers—I would like to say a word to the gentleman. He speaks about getting the Council to examine his books, with the aim of securing a "certificate of good character," so to speak. Suppose he lived in a community blessed with a Council so "small" that its members would not look at his books? To whom would he look for solace and consolation in that event?

Mr. Bates—We have a pretty "small" Council at Circleville, too. However, as said in my paper, a committee of influential citizens will serve every purpose; and I do not believe I claim too much when I assert that every community contains a sufficiency of fair-minded men who would undertake the duty mentioned.

On motion, a vote of thanks was awarded Mr. Bate.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Mr. McMillin, on behalf of the above-named committee, submitted the following:

To the President and Members:—Your Committee, to whom was referred the address of President Hickenlooper, with instructions to take into consideration the suggestions therein contained, and to report back at this or a subsequent meeting, submit for your action the following:

Resolved, That the Secretary is hereby instructed to have 500 copies of the president's address printed; that he send at least two copies to each and every gas company in the State of Ohio; that he accompany the said copies with a printed circular, calling the attention of the gas companies to that portion of the address referring to State legislation and control of gas companies; and asking the officers of the companies to express their views, in writing, upon this subject.

Resolved, That a Committee of three be appointed to assist the Secretary in the preparation of the circular referred to in the first resolution; and which committee shall tabulate the responses, if any, that are received from the gas companies; and if it shall appear, from these responses, that a majority of the gas companies approve of the plan suggested by Prest. Hickenlooper, then the committee shall notify the gas companies of the State of that fact, and urge them to employ all honorable means to have the Legislature pass an act embodying the principles suggested.

E. MCMILLIN,
R. R. DICKEY,
A. B. ROBINSON, } Committee.

On motion, the report of Committee was received and adopted.

[To be continued.]

Mr. A. B. Slater's System of Short Charges.

[The following letter is reprinted from the London *Journal of Gas Lighting*, in order that those who have perused Mr. Slater's mention of the subject, in prior issues of the AMERICAN GAS LIGHT JOURNAL, may have knowledge of the manner in which the controversy terminated.—ED.]

Sir:—In perusing the several numbers of the *Journal* which have lately been received, I find in the issue for March 2 your remarks relative to my letter to the AMERICAN GAS LIGHT JOURNAL on the subject of short charges. This letter was written after having read your comments on my paper therein referred to, which were republished in the above-named publication on Jan. 16th. In your last remarks you are pleased to characterize the letter as an "impassioned defence" of my practice. If this be so—and I must leave others to judge as to that—I will say for myself that I was not in the least conscious of any such feeling when writing it. It is true that the remarks which I therein referred to were yours, and I acknowledge that, as a matter of courtesy, my letter should have been addressed to you. But my feelings at the time were that the AMERICAN GAS LIGHT JOURNAL, in which your remarks were republished, was read by not only the members of the American Society of Gas Lighting, who were present when the paper was read, but, I may say, by many, if not most of the active gas managers on this side of the water (a large number—perhaps most of whom are more or less acquainted with me), and further, that the matter was of little more than passing interest to the majority of your readers.

As to the system of six-hour charges, allow me to say that I did not in the least question your statement that "most experienced managers have made up their minds as to the convenient duration of charges;" but my remarks referred simply to the fact that such was the case, having reference to no possible improvement, and also that in Providence we were mistaken in our ideas and practice of running three-hour charges. Again, you say that "Mr. Slater in another place admits his ignorance of English carbonizing practice; and we sincerely trust that when, in the fulness of time, he repairs this deficiency, he will be ready to confess that there are some gas managers on this side who know their business." Were I to make free use of the word "impassioned," perhaps it might be properly used with reference to this remark, as, after what I really said, I cannot understand the application; for, in the letter referred to, you will find I used the following language: "I cannot say that I am familiar with the benchwork of our English friends, and have little doubt but that conditions obtain there which, under their circumstances, may perhaps justify them in still adhering to six-hour charges; for I certainly have great respect for the ability shown by English gas engineers." And I will add that the history and progress of gas manufacture could not be written without abundantly showing that the gas engineers of England have occupied the first rank in this great industry. Once more I quote from you: "If he were working in some places he would find some other system preferable. The advantages which he ascribes to short charges are not a new discovery of his * * * and the tenor of his remarks upon this head has the distinct flavor of a suggestion that there is no other reason than 'old fogeyism,' and that the vanguard of the gas making army of both hemispheres is at present to be found at Providence, R. I." Now, I do not wish to deal in flings and innuendoes, nor "impassioned" utterances, but will simply refer to what I said—viz., "I do not mean to be understood as indiscriminately advocating the system of three-hour charges, because the conditions necessary to advantageous working would not always be present.' As to laying any claim to originality in the matter of three-hour charges, I do not pretend, and never have pretended to any such thing, and have repeatedly so stated at the meetings of our Gas Managers Associations when the subject has been under discussion. Allow me to say, for your information, that Mr. Charles F. Dieterich, of Baltimore, has the honor of being the first in America, so far as I am aware, who succeeded in producing and maintaining the necessary heat in the bench, and made a practical success of properly working off three-hour charges.

The last point to which I desire to call your attention is where you remark that, "upon the question of stopped ascension pipes, Mr. Slater has nothing to say." By reading a little more carefully I think you will find that I did say, "As to trouble with ascension pipes, pitch, etc., we are not sensible of having additional bother from such source now as compared with our experience when four-hour charges were the rule."

I append the result of one month's work with three-hour charges at our west station, as follows:

Day of month.	Yield of gas per lb. of coal. cu. ft.	Yield of gas per retort. cu. ft.	Illuminating power. candles.	Weight of charges. lbs.
1	5.19	12,300	15.75	296
2	5.20	12,333	16.00	296
3	5.28	12,400	16.33	293
4	5.19	12,750	17.00	307
5	5.25	12,917	17.25	308
6	5.15	12,172	17.40	295
7	5.22	12,862	17.50	308
8	5.24	13,310	17.10	318
9	5.32	13,357	16.40	314
10	5.21	13,000	16.83	311
11	5.17	12,679	16.83	307
12	5.17	12,786	16.25	309
13	5.21	12,893	17.00	309
14	5.24	12,893	17.25	308
15	5.10	12,167	17.46	298
16	5.20	12,067	17.62	290
17	5.28	13,077	17.10	309
18	5.38	13,435	16.75	312
19	5.26	12,522	17,00	292
20	5.02	11,714	17.83	292
21	5.14	11,689	17.67	285
22	5.10	11,793	17.30	289
23	5.16	11,897	17.38	288
24	5.33	12,103	16.42	284
25	5.35	12,034	16.20	281
26	5.24	12,138	16.37	290
27	5.22	12,034	17.70	288
28	5.35	12,655	18.00	296
29	5.31	12,207	17.70	287
30	5.26	12,103	17.67	287
31	5.29	12,000	17.25	284
Average	5.22	12,457	17.06	298

Coal used, 832.19 tons of Youghiogheny; 99.19 tons of American cannel.

Gas made, 10,902,000 cubic feet. Of the coke, 30.13 per cent. was used in the furnaces.

The retorts (Davison's) are set in benches of six. These retorts differ from ordinary retorts in being widened at the back end, say, three-fifths of the length, and have three ribs made up with and on the retort, which adds strength, and saves tiles and fittings in setting. The number of square

inches in the floor surface is 2,924. The retorts are 9 feet long, and take the ordinary 14 in. by 26 in. mouthpiece.

While I do not seek controversy, I appreciate fairness; and as I feel that your last remarks do me injustice, which I cannot believe you really intended, I ask you to publish this communication. A. B. SLATER.

PROVIDENCE (R. I.), U. S. A., April 23, 1886.

[The three-cornered character of this little controversy—some of which has gone on in the columns of the AMERICAN GAS LIGHT JOURNAL, and the rest in our pages—may prevent our readers from grasping the points which have been at issue between Mr. Slater and ourselves. We have no other feeling in the matter than a desire for the elucidation of the truth; and thank our correspondent for the information now conveyed. We must be permitted to say, however, that had Mr. Slater's first declarations upon this subject been couched in the tone of his last, our notices of his remarks would certainly have borne a very different color.—ED. *J. G. L.*]

Notes from the West.

By RETORT.

The most exciting struggle for the control of a gas company ever known in the West has been that waged for the ownership of the Kansas City (Mo.) plant. The fight has been carried on with St. Louis as the seat of war, and with Mr. C. H. Nash, of St. Joseph, Mo., as Commander-in-Chief of the attacking forces. In a former letter I referred to the fact that Mr. Nash had secured *almost* a controlling interest—lacking, in fact, but 81 shares. The struggle just previous to the annual election held at Kansas City, on May 26, was intense. Wonderful prices were freely offered for the few needed shares—as high as $750 in some cases—until Mr. Nash's agent wired him from Kansas City that he had secured the necessary stock; had it, in fact, in his pocket, and was on his way to meet his principal. In an exuberance of spirits the syndicate talked freely of their intentions, and did not attempt to disguise the fact that their ultimate design was to capture all the gas works of Missouri and Kansas, with a view of converting them into water gas plants, and thus open up a most lucrative territory wherein to sell naphtha. The consummation of the scheme would, of course, be of great interest to the various companies concerned. Its immediate effect would be the retirement of the present board of directors in each works as soon as control was gained, and the subsequent election of new boards, with Mr. Nash as president, etc., etc.

The Kansas City deal has been a misfit from the start, and has been a series of blunders and broken pledges. Deals have been made with men who had "enemies to punish," and who sought this means of healing up wounds caused during the St. Louis fight. The following, from a St. Louis paper, shows the position of Mr. Nash:

"It seems that the appointment of C. H. Nash as general Western manager has never been formally made, and if he is forced to bear the burden of the entire miscarriage of the water gas people's plans the appointment may not be confirmed. It is suggested, however, that the blame attached to the affair will be distributed, and that Mr. Nash will not be held wholly accountable for a failure to get the benefits of the $500 each paid for the voting power of 780 shares of stock, in addition to the $200 per share market value, the greater sum having been paid for votes alone. As the matter stands now, the most thoroughly happy people are the Laclede Gas Company's leaders. The blunders and divisions of the opposition give them renewed strength and courage."

This reminds us of a somewhat similar case which occurred a few years ago, when Mr. Jay Gould attempted to gain possession of a certain Western railroad. The fight took place at Cincinnati, Ohio, and "Jay" sent out his son to consummate the deal. When too late, the latter discovered he had been outwitted, and was obliged to so report to his father. The only comment uttered by the sagacious financier was, "That is what one gets for sending a boy to do a man's work."

W. W. Gibbs, General Manager of the United Gas Improvement Company, who was in Louisville, Ky., when these things were happening at Kansas City, in an interview stated: "He should start at once for St. Louis, and that the object of his visit would be the investigation of the Kansas City defeat, which was the most serious as well as the most expensive that the Philadelphia people had ever sustained. They had paid premiums on stock, but never as high as $750 for $200 stock; and then to not accomplish their purpose was so aggravating that some changes would be made in the persons doing the work of the Philadelphians in the West. The trouble and cause of the defeat was in the failure to have stock purchases transferred in season, or to get proxies in time for the election; and an effort will be made to locate the blame in the matter. The Kansas City move was the first in which the opposing interests in the recent St. Louis gas fight were brought together to attain one object; and to that fact is to be credited the mistakes made. The old jealousies and opposition were the chief factors—the opposing factions still, even while working to the same end, being in the opposition; and where questions and suggestions would have saved defeat and carried the day, none were asked or given until too late to remedy the matter in any way."

In the meantime the old board is secured for another year at least; and until '87 it will be out of reach of the "U. G." crowd. On the 26th ult. the old board was re-elected, as follows: Col. M. J. Payne, President; John W. Allen, Secretary; and Harry E. Clark, Superintendent. The Board of Directors will consist of S. V. Holliday and Margaret Lang, St. Louis; M. J. Payne, Harry E. Clark, and John W. Allen of Kansas City.

The defeated party now claims to hold within 17 shares of a majority; and the party in power claims a majority is positively held in a "trust fund pool" inaccessible to any outsiders, and not salable to anyone outside of the pool.

Practical Manufacture of Hydrogen Gas.

Engineering, speaking on the above, says that a novel method, invented by MM. Felix Hembert and Henry, of manufacturing hydrogen gas on a large scale, has been briefly described by them in a communication to the French Academy of Sciences. In a retort, superheated steam in fine jets is passed over coke in the state of incandescence. The gas mixture generated, which consists of equal volumes of hydrogen and carbonic oxide, is made to circulate in a second retort, also heated to a red glow, containing obstacles of a refractory material, so that the gases are well mixed and heated. At the same time more steam, heated to the point of dissociation, is admitted into this retort. The theory requires an excess of water vapor to insure the complete oxidation of carbonic oxide, the gases decomposed forming carbonic acid (carbon dioxide) and hydrogen gas. It is claimed that 3,200 cubic meters of hydrogen gas can be obtained per ton of coke, at a cost of 0.015 francs per cubic meter, equivalent to approximately one-tenth of a penny per cubic yard. When M. Fages first made hydrogen out of coal and water he could furnish hydrogen gas at 0.044 francs a cubic meter.

The Products of Coal Gas Tar—A New Discovery.

An English exchange discusses gas tar in the following hopeful strain:

"The wonderful products that chemical science has extracted from gas tar form the most brilliant series of discoveries which have characterized the last half century. Not so very many years since the gas water and the tar, now of such great value, were considered more of a nuisance than otherwise, and were turned into the nearest drain or course, so polluting the water. But now they have become so important for chemical and other purposes that they are tended with the greatest care, chemical experts being constantly at work upon them endeavoring to find new combinations of benefit to the world at large. Already from one of the products of distilled coal the magic of modern chemistry has obtained the most beautiful of colors, the sweetest of perfumes, the most plastic of materials for ornaments, toys, and tapers, as well as the most powerful of disinfectants. In addition to these we have the most valuable of the medicines, such as quinine, whilst the tar acids are admitted to be the most powerful antiseptics known. Indeed it was whilst Mr. Perkins was endeavoring to produce quinine from the coal tar that he was led to his great discovery of mauveine. It is only lately that quinine has been extracted from the tar, and great and valuable as have been the discoveries made from the material obtained from the distilled coal, the probability is that there are still greater ones in store for us. The latest discovery made public is that of Prof. Fahlberg, a German scientist, residing in the United States. It is stated, and that on reliable authority, that he has extracted from gas tar a new substance which he has named "saccharin," which he states is 230 times sweeter than cane sugar. At a recent meeting of the Royal Dublin Society, Prof. Emmerson, F.R.S., read a paper on the substance alluded to, seeing that he considered it of the greatest importance to medical practitioners, inasmuch as it can be used to sweeten and render palatable the food of persons suffering from diabetes, and for some months past has been used for this purpose in one of the Berlin hospitals. In appearance it is said to resemble flour, but is denser, and is dissolved slowly by hot water. Prussic acid, which may be said was first discovered by Scheele, in 1782, from ferrocyanide of potassium, is now extracted from gas tar, so that we have the most opposite elements obtained from the same source, the probability being that brilliant as the discoveries already made from the products of coal have been, they will be equalled, if not exceeded, by others from time to time. It is by no means unlikely that from the tar, brandy and other similar spirits will be obtained by a much simpler and cheaper mode than is the case at the present time. Already we obtain from it naphtha and paraffin. On distilling naphtha we have benzol, a very volatile, colorless liquid, which readily dissolves india rubber. What the future may bring forth in connection with the constituents of gas tar no one can even hazard an opinion, seeing that there is such a vast field open to our chemical scientists, and no doubt long years will have to elapse before all, or nearly all, its valuable products are brought to light and its marvelous history made known to the world.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The Assessment Rating of Gas Companies.—Amongst other schemes of extortion (for by no other name may they be justly designated) practiced by the municipal authorities of to-day, perhaps the assessment of what is denominated "personal property" might be said to take the palm. It is not the province of this column to comment greatly thereon, nor would any good end be effected by such comment; but we cannot forbear from making mention of a certain query recently emitted by a "Taxpayer," or one who claims to be such, and who is supposed to live in the city of Grand Rapids, Mich. This taxpayer is peculiarly puzzled over one item in the Grand Rapids assessor's return of personal property, and his plaint assumed the shape (the usual one taken by "Indignant Citizen," "*Pro Bono Publico*," "Reformer," etc.) of a communication indicted to the editor of the *Telegram-Herald*, the "leading journal of Grand Rapids, ever ready to give voice to the sentiments of the citizens." Mr. "Taxpayer's" query read like this—after the reviser had looked it over, possibly: "Can you inform me how it comes that the Grand Rapids Gas Company's personal property is assessed by the Supervisor of the Second Ward at only $5,000, while Spring & Co.'s property is assessed at $42,000? Are the mains of the Gas Company considered personal property? How many miles of gas mains could be laid for $5,000?" Oh, yes, Mr. Taxpayer; gas mains are personal property—in the strictest sense of the word, too. They are, so to speak, "pocketed" in the ground. As near as we can make it out, the Grand Rapids Gas Company's real estate, etc., is taxed on a valuation of, say, $175,000; we presume that its stock is taxed, and perhaps its dividends also. If that array of tax lists does not cover about everything owned and not owned by the Grand Rapids gas purveyors, we would suggest that "Taxpayer" petition the Grand Rapids Council to tax the salaries of the local gas makers, from President Gilbert down to the lamplighters, on the ground that the privileges granted the corporation by the municipality enable the wage-workers to earn their checks. "How many miles of gas mains could be laid for $5,000?" The editor refuses to answer this query; but suppose we try to give "Taxpayer" a lift in regard thereto. It would depend to a great extent on the nature of the "personal property" enjoyed by the one who undertook the job, dependent also in slight measure upon the length of the miles; and possibly influenced more or less by the "specifications laid down." In all seriousness, however, we would call "Taxpayer's" attention to the singularly good chance afforded by the surging depths of his own Grand River to secure a plunge bath therein. Such a plunge could not harm him, provided his head is hard unto the hardness of his cheek; and the chances are in favor of uniformity of hardness of both.

Annual Election, Camden (N. J.) Gas Company.—At the annual election of the Camden Gas Light Company (held June 7) Messrs. Ben. F. Archer, S. C. Cooper, C. Watson, and R. F. Smith, of Camden, and Wm. Helme, of Philadelphia, Pa., were elected a Board of Directors. Organization proceedings resulted in the selection of Mr. B. F. Archer to the Presidency, Mr. Chas. Watson being chosen Secretary and Treasurer.

Increasing the Capacity of the Bridgeport Plant.—The additions now being made to the Bridgeport (Conn.) Gas Light Company's plant will bring the manufacturing capacity of the works up to the point where one-half million cubic feet per diem can be delivered. Mr. Gerdenier can now rest easy, and we expect it is needless to mention anything about the bother experienced in the times (by far too long stretched out) now happily over. We are unable to here give fuller particulars as to the general plan of the betterments; but these may come along in good season. Let us hope so, at any rate.

Is it for an Electric Lighting Plant?—We understand the Jarvis Engineering Company, of Boston, Mass., has furnished a complete steam plant to the Manchester (N. H.) Gas Light Company. The apparatus includes a 60-horse power Armington & Sims engine; tubular boiler, with Jarvis setting calculated for the consumption of coke screenings or breeze; Korting injectors, etc. From these items we conclude that the Manchester Gas Company must be going into the electric lighting business. If they manage the new venture as well as they have the old, enough is said.

New Electric Light Companies.—We have information that electric lighting companies have recently been chartered to operate in the following-named cities: Natick, Mass., capital stock $30,000; Camden, N. J., capital $100,000; Defiance, Ohio, capital $15,000; Galesburg, Ills., capital $20,000.

The Wilbraham Gas Exhauster.—The Wilbraham exhauster ordered by the Gas Trust to be placed in the 25th Ward works of the Quaker City gas plant during the fall of 1884, has been in continuous working duty since the 10th day of November in that year. It has passed the entire make of that station (the maximum sendout in 24 hours was 3,726,000 cu. ft.) with ease when working at moderate speed. It has in every particular upheld the promises of its builders, which assertion is corroborated by the statement that the Messrs. Wilbraham have been ordered to construct two similar machines to be installed in the 9th Ward station of the Gas Trust's works. Among other orders recently received we may note the Burlington (Iowa) Gas Light Company will take a large exhauster; while the Omaha (Neb.) Gas Manufacturing Company will do likewise. A small instrument, with engine attached, goes to the works of the Greenfield (Mass.) Gas Light Company; and other gas companies are about to be placed on the Messrs. Wilbraham's list. It is a pretty old-fogeyish gas plant that cannot see its way clear to putting in an exhauster; and although chanting one's own praises generally sounds like discord to other ears, we will take the liberty of saying that we believe the exhauster manufacturers of this country (not one; but all of them), as a rule, produce far handsomer machines than are turned out from the shops of our foreign brethren. Understand, this is not written in derogation of the value of the latter's work; but our machinists, in addition to seeing that solidity and accuracy are combined in their goods, finish off their wares in a manner closely approaching the artistic.

To Furnish the Gas Fixtures.—A New York firm, that of Messrs. Archer and Pancoast, have been awarded the contract to furnish the gas fixtures to be put up in the new State House building at Indianapolis, Ind. The price ($35,803), was over $4,000 higher than that made by a local firm, but the commissioners decided that the difference in the samples submitted more than justified the course taken.

American Water Works Association.—Mr. J. H. Decker, the Hannibal (Mo.) gas man, Secretary of the American Water Works Association, writes us the annual (sixth) meeting of that association will be held in the Albany Hotel, Denver, Colorado, on June 23d, 24th and 25th. The programme is indicative of a most interesting gathering. No less than 12 papers are to be read; and the sight-seeing will comprise a visit to the Boston and Colorado Smelting Works at Argo, which means that the travelers while *en route* will view the wonders and beauties of Clear Creek Canyon, Idaho Springs, Georgetown, and Silver Plume—and this fact alone makes us sad to think we are not to be amongst the favored. On the evening of the second day (Thursday) the Denver Water Company will entertain the Association at a banquet.

Reducing Price of Gas at Kansas City, Mo.—In another column will be found an account, from the pen of "Retort," of how Mr. Nash failed to successfully assail the fort so long and honorably garrisoned by Col. M. J. Payne and associates—possibly the fort would be more readily recognized if we say that it comprises the stock and plant of the Kansas City Gas Light Company. "Retort," however, forgot to mention how the Colonel celebrated the repulse; and we will rectify the omission by giving the terms of the peace. No sooner had the panting frame of Mr. Nash been reduced to a state of comparative quietude than the following amnesty was proclaimed: Gross price of gas was reduced from $2.25 to $2 per thousand, and prompt payment secures a rebate of five or ten per cent., conditioned on the monthly quantities of gas consumed. The company also pledged itself to increase the manufacturing capacity of the plant by at least 70 per cent., and to add at least five miles of conduits to the present distributing system within the current year. The Kansas City amnesty ought to please the inhabitants thereof, even though Mr. Nash is rather cast down.

Annual Election, Georgetown (D. C.) Gas Light Company.—The annual election for directors in the Georgetown Gas Light Company took place on date of June 8th. The gentlemen chosen were Messrs. W. F. Seymour, R. P. Dodge, J. H. Smart, T. Knowles, G. W. Cropley, S. T. Brown, and W. B. Orme. Mr. Brown succeeds Mr. D. F. Robinson; and Mr. Orme replaces Mr. Buckner. We take these changes to mean that the interests of the Washington and Georgetown Gas Light Companies are more closely intertwined than ever; and the Philadelphia and other syndicates, although they had ample evidence of the fact long since, are possibly now more than ever convinced of the sagacity and commercial acumen possessed by Mr. Geo. A. McIlhenny, of the old Washington Company. Although the changes are matters accomplished, we cannot forbear wishing that Mr. Buckner could have seen his way clear to keeping on in the service, for to him the Georgetown Company can trace its formation. After dint of hard struggling he succeeded in starting the enterprise, on a capital basis of $75,000, at a time (in 1853, we believe) when capitalists were chary of putting their funds in what were denominated in that day "extremely hazardous risks." And this leads us on to say that those who made these "ventures" then, and who withstood the trials, perplexities, and losses incident to the development of a business, but then in its infancy, must now submit to be either blackmailed or robbed by the scions (it may be even by their contemporaries) of those who sowed none of the toil, but who are eagerly anxious to gather the fruit. However, and to come back to the subject, we believe that Mr. Orme (Mr. Buckner's successor) represents in reality the Bartol interest, so it is certain that the founder's place will be worthily filled.

Improvements at the Nashua (N. H.) Plant.—Brother Norton is actively engaged in making things trim up at Nashua, and in order to "set matters straight" he invoked the aid of Messrs. Davis & Farnum, of Waltham, Mass. These gentlemen, upon receiving their instructions to go ahead, did so with a will, and by date of September first the betterments will be in working readiness. The plans call for the erection of two new benches of sixes and fittings; and the purifying house will have four new boxes, equipped with the Davis system of valves. The latter work is now well along towards completion.

Purifiers for the Washington (D. C.) Gas Works.—The Southwark Foundry and Machine Company, of Phila., Pa., will build, to the order of the Washington Gas Light Company, a set of four purifiers. Anderson valves are to be employed instead of a centerseal.

It is the Newspaper Verdict.—Tomlinson Hall, Indianapolis, Ind., is occupying a large portion of the Hoosier mind just now; and in truth they have good reason to think well of the building, for it is an elaborate, handsome, and imposing structure. It may be said that the eye of all hoosierdom was cast Indianapolisward on the evening of June first, for at that time Tomlinson Hall was to be "inaugurated" by an exceedingly grand and tunefully melodious musical festival. Everybody present says that the "opening" was in accordance with the "scale" of the building; hence must it be written down as a success. But it is in regard to the lighting arrangements that we have greatest interest, and as it is matter of record that people persist in claiming great advantage for the arc light over gas as an illuminator of large assembly rooms we wish to call attention to the verdict passed upon the question by the editor of the Indianapolis *News*. This is what he said: "The exterior electric lights were turned on at dark. They are as indispensable and as satisfactory outside as the gas is inside. The light within was sufficiently strong, yet mellow; and the wisdom of employing gas, rather than electricity, was apparent."

The Quality of Newark (N. J.) Gas.—According to the returns of the gas inspector of Newark (Mr. A. T. Schussler), for month of May, we learn that the gas supplied by the Newark and Citizens Companies was well within the stipulations as to purity. The average illuminating power was also beyond the legal requirement.

Gas for Durango, Col.—We have advices that the Durango Light Company, organized some time since, and granted a franchise by the votes of the people at the recent spring election, will at once proceed with the work of construction. The stock has all been subscribed for by residents of the place. It is expected to supply gas on or before Oct. 1.

Street Lighting at Camden, N. J.—On evening of June 2 the Lighting Committee of Camden City Councils received bids for lighting the street lamps for ensuing year. Bids were made as follows: Camden Gas Light Company, $25 per post per annum; Pennsylvania Globe Gas Light Company (naphtha), $22; Camden Lighting and Heating Company (electric system), 50 cents per night each light, or $182.50 per annum. The contract as to city proper was awarded to the Camden Gas Company, the Globe Company securing the right to light the extreme southern section of the place with naphtha lamps. No attention was paid to the bid of the electricians, save to reject it.

Gone to Rest.—We regret to announce the decease of Mr. H. H. Rathbun, Sr., who was the founder of the village of Deseronto, Ontario, and the controller of the Deseronto Gas Company. He was King of the lumber operators in Central Ontario, and a really remarkable man. His death occurred on June 2d, and interment of remains was made at Auburn, N. Y., in which city he was born just 75 years ago. Those who knew him in life will now regret the loss of a staunch and honest friend.

Perhaps They Might Better Keep Still.—The Newburgh (N. Y.) branch of the Thomson-Houston Electric Lighting Company feels pretty sore over the action taken by the City Council in awarding the public lighting to the gas company for another year; and, in fact, the disgruntlement of its managers is so great that they have been deluging Mayor Odell with complaints and protests anent the final disposition of the matter. The Mayor has examined the plaints with due care, and remits the "mess of sorrow" to the Council with the remark, "That these communications do not appear to require any action, but are forwarded to you only that they may be properly filed among the city papers." He does, however, comment on one of the statements made by the electricians (which is to the effect that the contract with the gas company is illegal) in this style, "The protest claims that the contract is illegal for various reasons not necessary to notice in detail. I am advised that the contract is in all respects valid. It is made of record now, however, by their protest, that the electric lighting company do not think so, and would not have regarded any contract made with the city as binding on that company, for the reasons set forth in the protests." Perhaps the electricians would not lose anything if they kept still.

Something from Sharon, Pa.—Mr. Joshua Gill, the manager of the Sharon Gas and Water Company, writes us that an important cut was made in gas rates on date of April first. The former gross charge of $2 per 1,000 is reduced to $1.75; while a consumption of 10,000 cu. ft. and over per month entitles the user to a rate of $1.50. If bills are not settled within 10 days from date of presentation, prior rates will be charged. The annual stockholders' meeting held on Saturday, May 29th, resulted in the election of a directorate comprising Messrs. S. Perkins, Jr., M. H. Henderson, T. J. Porter, J. Forker, and D. R. Shiras. Subsequently the board was organized by naming S. Perkins, Jr., President; M. H. Henderson, Treasurer; Joshua Gill, Superintendent and Secretary. The Sharon plant is being greatly improved; and the scale on which the betterment is planned speaks strongly as to the confidence which Supt. Gill possesses in regard to the future business of the company.

A Western Senator.—Senator Van Wyck, who represents (in the Upper House of the United States Legislature) that aggregation of culture and wealth resident within the boundaries of the State of Nebraska, appears to be most anxious to pluck the *pate de foie gras* from out the kitchen of the Washington (D. C.) Gas Light Company. Indeed, his mission at Washington, when scrutinized in all its details, does not appear to have any connection with the interests of the people who voted him into a seat in the Senate; and we may perhaps be pardoned for suggesting that if he would turn his attention to gas matters much nearer home—say, for instance, at his own dear Omaha—he would find a sufficiently extensive field wherein to exercise his missionary labors. Geese are reputed to grow fat "away out in Omaha," and fat geese are productive of richly-flavored *pates*, provided the proper sort of a *chef* is entrusted with the task of "doing them up." The plain English of the case is that the present set of Washington gas investigators are anxious to "pluck" the Washington bird; but, Van Wyck to the contrary, we have a strong impression it will be some little while before that goose is immersed in a hot water bath strong enough to permit of the easy removal of its feathers.

A Word or Two from Stockton, Cal.—Mr. Henry Adams, Supt. of the Stockton Gas Light and Heat Co., paid us a visit the other day, while on his way East to visit the home of his early boyhood—amidst the rugged slopes of the great old Granite State—which he had not seen for 25 years, or since the time when, at the age of 12, he turned his steps towards the setting sun. Mr. Adams reports that the Stockton company's annual output represents a make of 26 millions cu. ft., and the increase, one day over another, is most gratifying to the owners of the plant. The price charged is $3 per M., and that figure is perhaps equal to a rate of $1.90 in this section of the country. The price received for street lamps is $2.60 each per month, to burn on 27 nights of the month; and the lanterns are equipped with burners rated to consume 5 cu. ft. per hour. In consideration of the exclusive franchise bestowed upon the company the municipality receives 15 lamps for which no charges are made.

It is True.—The city of Poughkeepsie, N. Y., is now entirely, though badly, lighted, as to its streets, by the electric light. The electrical promoters assert that to make the light effective the limbs of the shade trees must be lopped off. Perhaps one of the pleasantest features of Poughkeepsie's streets in summer was the handsome appearance given the roadways by the elegant shade trees which embowered them.

To Restrain a Gas Company.—Solomon Bergman has brought suit to restrain the St. Paul (Minn.) Gas Light Co. from manufacturing gas and maintaining gas tanks within 225 feet of Solomon's premises. The tanks which are so offensive to this later-day Solomon are located on what is known as "block 47 of Kittson's addition," and the plaintiff owns houses on lots 7 and 8, in block 41, of the "same addition." The complaint alleges that the gas tanks are a nuisance, that the "odor from the same is noxious and offensive" to the plaintiff's tenants. The court is asked to restrain the company from manufacturing gas, or from any further enlargement, as contemplated, of the gas tanks. This gentleman should amend his petition so to make it read that the St. Louis Gas Paul Co. be ordered to present him with all the real estate owned by it in "Kittson's addition." If that division were made he could be trusted to remain in silence.

Reformer Sherwood Wants to Make Gas.—The *Times* of June 10 says that articles of incorporation have been filed at Albany, N. Y., by John H. Sherwood, Judge Henry Hilton, Russell Sage, John J. Levy and others, to incorporate the Consumers Gas Co., the object being to manufacture and sell gas in the city of New York at a uniform rate of $1 per M. The capital is placed at $5,000,000. Sherwood, Sage, and Hilton! What a trio of benefactors!

A Complete Line of Disinfectants, etc.—Mr. W. H. H. Childs, of No. 73 Maiden Lane, this city, keeps constantly adding to the large line of carbolic acid goods manufactured by him. Among other specialties we note he advertises that he is prepared to supply carboncrystal in any quantity desired. Mr. Childs may be relied upon to furnish strictly what his catalogues call for in the matters of purity, weight, and quality.

THE AMERICAN GAS LIGHT JOURNAL

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WEDNESDAY, JUNE 16, 1886.

A Cement Formula Worthy of a Nook in a Note-Book.

The *American Engineer* calls attention to a cement which, if made in accordance with the plan proposed, that authority claims will resist the advances of sulphuric acid, made even at a boiling heat. Melt caoutchouc at a gentle heat, and stir in from six to eight per cent. of tallow. Then mix in enough dry slaked lime to make the whole the consistency of soft paste, after which add about 25 per cent. of red lead, which causes the mass to set hard and dry. A mixture of caoutchouc in twice its weight of linseed oil, and the addition of an equal amount of pipeclay, will form a paste that will resist the action of most acids.

Gas Wells Fired by Lightning.

The *Fireman's Journal* says that the burning of natural gas wells in Pennsylvania are sights as thrilling to the beholder as they are dangerous to adjacent property. We have given the particulars of these on various occasions. Recently one of these wells took fire, and a volume of flame shot up into the air for several hundred feet with a velocity that was astounding, showing that the pressure of gas from beneath was something beyond comprehension. This well burned for a long time in spite of all efforts to shut off the flame. It was finally done by means of a huge extinguisher, which was advanced slowly to the mouth of the well and then raised vertically, thus shutting off the air and smothering the flame.

A few days since one of these wells was set on fire in a very curious manner. The workmen had drilled down until gas in small quantities was found to arise through the boring. A sudden storm came up; the atmosphere became thick and prevented the gas from rising freely. The workmen anticipated trouble and hastily departed from the well. They had scarcely got to a safe distance when a flash of lightning ignited the gas in the atmosphere over the well; flames instantly communicated to the well itself, the result being that the gas in the lower regions was released, and shot upward with a terrific flame to a height of 200 feet or more. The well burned for several days, the column of flaming gas mounting into the air and lighting up the surrounding country for miles. Another well was struck at the same time in another section of the oil regions, and was burning for a long time, threatening adjacent property. Fires occurring in the products of the oil regions, whether gas or oil, are extremely difficult to extinguish, and the amount of property lost in consequence of them is immense.

Water Tests.

Test for Hard or Soft Water.—Dissolve a small quantity of good soap in alcohol. Let a few drops fall into a glass of water. If it turns milky, it is hard, if not, it is soft.

Test for Earthy Matters or Alkali.—Take litmus paper dipped in vinegar, and if, on immersion, the paper returns to its true shade, the water does not contain earthy matter or alkali. If a few drops of syrup be added to a water containing an earthy matter it will turn green.

Test for Carbonic Acid.—Take equal parts of water and clear lime water. If combined or free carbonic acid is present, a precipitate is seen, to which if a few drops of muriatic acid be added, an effervescence commences.

Test for Magnesia.—Boil the water to a twentieth part of its weight, and then drop a few grains of neutral carbonate of ammonia into a glass of it, and a few drops of phosphate of soda. If magnesia be present it will fall to the bottom.

Test for Iron.—Boil a little nut gall and add to the water. If it turns gray or slate, black iron is present. 2d.—Dissolve a little prussiate of potash, and if iron is present it will turn blue.

Test for Lime.—Into a glass of the water put two drops of oxalic acid and blow upon it, if it gets milky, lime is present.

Test for Acid.—Take a piece of litmus paper. If it turns red there must be acid. If it precipitates on adding lime water it is carbonic acid. If a blue sugar paper is turned red it is a mineral acid.

The Market for Gas Securities.

The attorney for the Gas Consumers Association has notified the executive management of the Consolidated Gas Light Company that the Attorney General will, on June 22d, hear argument on the question of the propriety of remitting the property of Consolidated to the hands of a receiver. The Association claims the consolidation is illegal; that the capitalization is excessive; and that the company is without authority to carry on its business. Can fatuous mendacity be carried to greater limits? Yes; because, in the meantime, the Consumers Gas Company has filed articles of incorporation. Thus, putting the winter's doings at Albany, in comparison with the summer's revelations in New York city, we have a fair line as to the operations of the Thurber, Hilton, Sage *et al* combination in the city stock market. It is pretty well understood that certain Wall street vampires are heavily short of Consolidated stock below the figure of 80; and it is equally certain that the shares, when relieved from the pressure of chicanery, are inclined to advance with marked rapidity. The surest guide to the value of any stock is the price it will bring at auction, and some few days ago 24 shares of Consolidated were sold by Muller at 82¼, the exchange quotation for same day being 80. Those worthies who boast that Consolidated will sell at 60 had better begin to cover; and the Consumers aggregation may be trusted shortly to experience the fact that not only has the Consolidated Company "authority to carry on its business," but is also in possession of the means to punish some of the braggarts who are disposed to pursue the tactics followed by the thrifty cuckoo. The cuckoo line of work had the effect of driving down prices, at opening of board on Monday, to 76¼, and our regular quotation will furnish closing figure on same day. Consolidated is a purchase for investment. Brooklyn shares are weak. Brooklyn companies pay following dividends: Citizens and Metropolitan, 3 per cent. each on July 1st.; Peoples, 1½ per cent., June 15; Nassau, regular quarterly, 2 per cent., July 1; Williamsburgh, 3 per cent., July 1. At auction, 18 shares Equitable, city, at 125½; — shares new stock, at 92. Brooklyn shares: 600 Brooklyn, at 110½-111½; also, 500, shares (June 2), at 107 112¾; 50 Fulton Municipal at 148.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 WALL ST., NEW YORK CITY.
JUNE 16.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	77	77½
Central	440,000	50	70	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	120	125
" New Stock			150	155
" Bonds	1,000,000	—	107	110
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	113	—
Mutual	3,500,000	100	110	112
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	50	—
" Scrip	108,000			
Yonkers		50	51	55
Richmond Co., S. I.	300,000	50	—	92
" Bonds	40,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	—	122
Citizens	1,200,000	20	79	81
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	148	150
" Bonds	300,000		104	108
Peoples	1,000,000	10	75	77
" Bonds	290,000	—	106	107
" "	250,000	—	103	—
Metropolitan	1,000,000	100	—	93
Nassau	1,000,000	25	120	122
" Ctfs	700,000	1000	101	102
Williamsburgh	1,000,000	50	128	130
" Bonds	1,000,000	—	112	114
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	85	90
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	115	120
" " Bonds	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	135	142
Peoples G. L. & C. Co., Chicago, Ills	3,000,000		8	12
Cincinnati G. & C. Co.			184	187
Consolidated, Balt.	6,000,000	100	48	48¼
" Bonds	3,600,000		107	107½
Chesapeake, Balt	1,500,000	100	71	74
"	1,000,000		100	102
Central, S. F., Cal			67	—
Capital, Sacramento, Cal.			55	58
Hartford, Conn	750,000	25	136	140
Jersey City	750,000	20	155	160
Laclede, St. Louis, Mo.	1,600,000	100	92	97

Louisville, Ky.....	1,500,000	50	100	102
Montreal, Canada.....	2,000,000	100	181	182½
New Haven, Conn.....		25	180	190
Oakland, Cal.....			—	34
Peoples, Jersey City...		—	25	30
" " Bonds..			—	—
Paterson, N. J.....		25	90	—
Rochester, N. Y.....		50	75	80
St. Louis, Missouri.....	600,000	50	—	500
San Francisco Gas Co.				
San Francisco, Cal....	10,000,000	100	58¾	59½
Memphis (Tenn.) Gas...	750,000	100	78	80
" Bonds.	240,000	100	103	—

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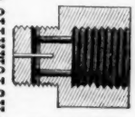

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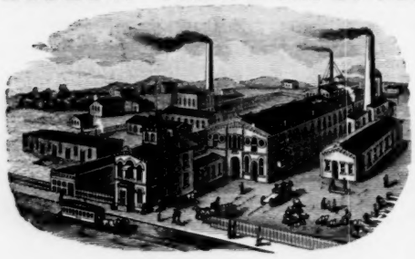

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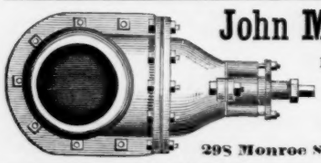

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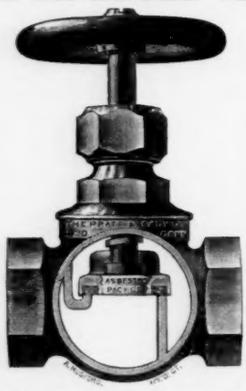

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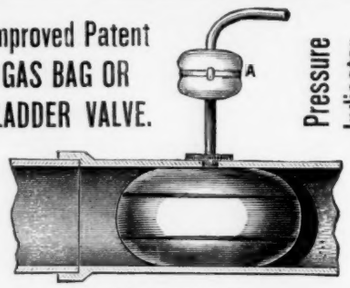

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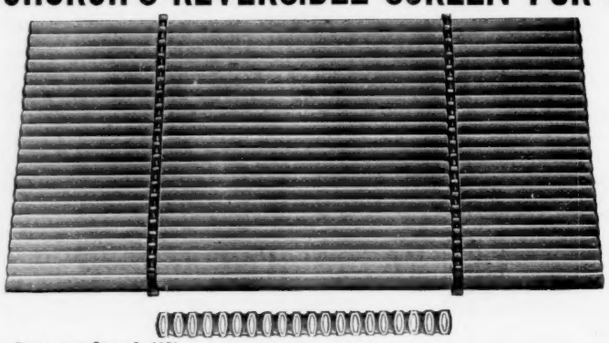

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